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Reports of Departments, Special Reports, reprints, etc., etc., should be sent as soon as they are issued.

Books for Review.

The Editor will be glad to receive books for review in the *Veterinary Bulletin*.

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IMPERIAL BUREAU OF ANIMAL HEALTH

THE

VETERINARY BULLETIN

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DISEASES CAUSED BY BACTERIA AND FUNGI

FORSSMAN, J. (1938–40). **Studies in Staphylococci. XIII. A Further Contribution to the Understanding of the Immunity to Staphylococci. XIV. The Fixation of Staphylolysin by Blood Corpuscles and the Haemolytic Action of Staphylolysin. XV. The Range of Action of the Staphylolysins.**—*Acta path. microbiol. scand.* **15.** 396–425; **16.** 335-345, and **17.** 232–254. 16 tables. [Numerous refs.] [In English]. [For previous parts, see *V. B.* **10.** 573, and **11.** 1].

XIII. F. discusses again at some length the nature of staphylococcal immunity, together with further experiments. He reasserts that immunity against a rapidly killing dose of staphylococci can be produced by injection of formalinized vaccine, and appears in general after about the 57th–60th day, reaching its maximum on the 75th–94th day. In his experiments, 13 out of 14 vaccinated animals survived. He states that such animals have little if any antilysin, but survive and have a serum which can be used for passive protection. Potent antilytic sera may, however, afford no protection. Moreover, "standard sera" and other sera which are highly antilytic (*i.e.* against filtrates), anti-necrotic, and anti-lethal are not always protective; whereas, on the other hand, sera containing minimal quantities of antilysin etc., have afforded protection. (Protection refers to protection against his rapidly killing dose of organisms.) He concludes that in testing the protective (prophylactic or therapeutic) value of a staphylococcal serum no significance can possibly be ascribed to the antilytic, anti-necrotic or anti-lethal values, particularly the use of anti-rabbit cell values for sera for human use. In his opinion the only test method of value is the testing of sera for their protective action on experimental animals.

XIV. In 1933 and 1934 [*V. B.* **11.** 1.] F. published three papers including observations on the fixation of staphylolysins by various blood corpuscles and the haemolytic action of these lysins. He now reports four further experiments on the same question.

Relatively small amounts of lysins of a kind known to be suitable were added to large quantities of blood (*e.g.* 0·06 c.c. of a lysin whose end point was 0·15 for 1 c.c. of 1% cells was added to 1·5 c.c. of 30% red cells). Rabbit blood was used in the first experiment, sheep blood in the second. Portions were removed at intervals in different experiments, *viz*, at once, after 5 min., 15 min., 1 hour, and 4 hours. They were centrifuged, and retitrated immediately, readings being made after 1 hour at 37°C. and after a further 20 hours at 4°C.

It was found that in one experiment the lysin was fixed in 5 min. but was entirely free again after 1 hour. In others that the amount of lysin left after contact with, and haemolysis of, a large excess of cells was as great as in corresponding controls containing no cells.

F. concludes as before that the form of fixation which occurs in haemolysis by certain staphylolysins is quite different from that found in haemolysis by immune haemolysins, etc., and that the fixation of these staphylolysins by red cells is easily and rapidly dissociated, sometimes so rapidly that it is not detectable by the usual experimental methods.

XV. F. describes a series of experiments on the subject, including titrations of various staphylolysins before and after filtration against a wide variety of red cells, and titrations of antisera made with lysins which showed relatively high activity against rabbit, sheep and human cells respectively. The work of other workers on the subject of the various staphylolysins is also discussed at some length.

He concludes that the pathogenic staphylococci possess a large series of different haemolysins active against different kinds of corpuscles and "furthermore, it appears that two antigenically different variants of each such lysin occur, in any case as far as the lysins against rabbit, sheep, ox, human and guinea pig blood are concerned." He considers that the lysins commonly called α and β lysins are not simple lysins, but lysin mixtures which may vary in composition from time to time. He therefore regards the names as unjustified and believes that they should be replaced by names signifying the lysins acting or at least their chief lytic action, concluding that α lysin could be named rabbit lysin and β lysin hot-cold sheep lysin respectively.—A. W. STABLEFORTH.

I. COWAN, S. T. (1939). **Classification of Staphylococci by Slide Agglutination.**—*J. Path. Bact.* **48.** 169–178. 2 tables. [10 refs.]

II. FAIRBROTHER, R. W. (1940). **Coagulase Production as a Criterion for the Classification of the Staphylococci.**—*Ibid.* **50.** 83–88. 2 tables. [7 refs.]

I. C. has examined by the slide agglutination method the serological characters of 105 strains of staphylococci, *viz*, 86 *Staph. pyogenes*, 15 *Staph. epidermidis* and 4 scurf staphylococci. The majority of the 86 strains of *Staph. pyogenes* fell into three well-defined types, type I containing 28, type II 16 and type III 15 strains. Twenty-six strains gave atypical results, only one remained entirely unclassified. The atypical strains showed a close relation to one or other of the types, but gave irregular results with absorbed sera. None of the *Staph. epidermidis* or scurf staphylococci reacted with any of the type sera prepared with *Staph. pyogenes*. Results with a few sera made with strains of *Staph. epidermidis* or a scurf staphylococcus indicated that these strains are serologically heterogenous.

The serological characters of the strains were found to be constant over a period of 18 months. Sera prepared with 18-hour plain broth cultures were better than those prepared with three-hour 0·05% glucose broth cultures, in the sense that the sera withstood better the removal of heterologous antibodies without removal of homologous antibodies. On the other hand, the young cultures in glucose broth gave slightly more specific results in agglutination tests.

The three-hour glucose broth cultures for serum production were killed by bringing rapidly to 100°C., the 18-hour plain broth cultures by heating at 62°C. for 1 hour or by adding 0·5% of formalin. The 3–4 hour glucose broth cultures and 18-hour plain broth cultures for agglutination suspensions were both rapidly heated to 100°C., and resuspended in broth.

II. F. examined the coagulase production of 127 strains of staphylococci from active infections and 122 strains regarded as commensals or contaminants, together with 11 strains of other species of bacteria. He confirms earlier observations that coagulase is formed only by pathogenic staphylococci. He discusses concisely the various other characters which have been regarded as an indication of pathogenicity and suggests that the genus should be primarily subdivided into coagulase-positive and coagulase-negative strains. Coagulase-positive strains are pathogenic, usually ferment mannitol, may produce *aureus* or *albus* pigment, form soluble haemolysins, and should be designated *Staph. pyogenes*. Coagulase-negative strains are non-pathogenic, do not usually ferment mannitol, more often form *albus* or *citreus* pigments, do not produce soluble haemolysins and should, in his opinion, be designated *Staph. saprophyticus*. Subdivision of *Staph. pyogenes* can be made on the basis of pigment production or serology, and of *Staph. saprophyticus* on the basis of pigment production.

Pigment production is unsuitable for primary differentiation because it varies considerably according to conditions and shows only a moderate degree of correlation with pathogenicity. The production of soluble haemolysin is an important criterion but (like pathogenicity for rabbits) involves much time and expense since the cultural requirements for the several haemolysins are not the same. Serological methods, though valuable, are not yet sufficiently developed. Positive results with sera for COWAN'S [see I] three main types were obtained only with coagulase-positive strains. Coagulase production is, on the other hand, easily tested

under routine conditions. Attention is drawn to the fact that test plasma can be kept for many weeks at 0–2°C. and that it does not matter if it comes from patients with a high anti-haemolysin or anti-leucocidin titre or from patients with a high blood urea (up to 340 mg. per cent.). The routine method consisted of inoculating citrated plasma, diluted 1 : 3 with saline, with a loopful of 24-hour culture from a solid medium on several drops from a liquid medium, incubating at 37°C. and reading at hourly intervals for 4–6 hours and, finally, at 24 hours.—A. W. STABLEFORTH.

KOURILSKY, R., & MERCIER, P. (1940). Étude expérimentale sur les variations du pouvoir pathogène du staphylocoque. **[Variations in the Pathogenic Power of Staphylococci].**—*Rev. Immunol.* **6.** 116–131. 4 tables. [3 refs.]

The authors have found that staphylococci may be present not only in the anterior nares of staphylococcal patients but also of almost all normal subjects. Usually the pathogenicity of nasal strains was about ten times greater in infected than in healthy persons, but only about one-tenth as high as that of strains obtained from skin lesions due to staphylococci. Great variation in pathogenicity of strains derived from different tissues in infected and healthy subjects was noted. Experiments are now described of injections into different tissues of rabbits of strains of staphylococci of varying pathogenicity, in order to determine upon what factors these variations in pathogenicity depend. As the toxigenic properties of all strains of staphylococci are similar and more or less constant, the pathogenicity of the organisms depends upon their power to invade and multiply in the tissues. Adipose-connective tissues (peri-renal fat and subcutaneous tissue) and, to a lesser extent, the liver and spleen are the most easily invaded. This analysis explains to a large degree the predilection sites of staphylococcal infections.—C. V. WATKINS.

WYND, F. L., & BRONFENBRENNER, J. (1939). **The Nature of the Catalase Reaction in the Residue of *Staphylococcus aureus* Lysed by Bacteriophage.**—*J. Bact.* **38.** 659–675. 6 figs., 7 tables. [16 refs.] [Authors' summary copied *verbatim*].

I. Cultures of *Staphylococcus aureus* lysed by bacteriophage exhibit no utilization of oxygen. II. Lysis by bacteriophage does not destroy the catalase activity of this organism. III. The catalase present in the filtrate of lysed cells is in a very labile condition, and it appears to destroy hydrogen peroxide by an irreversible stoichimetrical reaction. IV. This catalase reaction is inhibited by cyanide. V. The destruction of hydrogen peroxide proceeds in accordance with the equation for a unimolecular reaction and the reaction constant is that of the *rate of inactivation of the enzyme*, and not that of the disappearance of the substrate. VI. The similarity of the present results with those obtained by Northrop on liver preparations shows that when catalase is more or less freed from intimate association with cellular structures it is unable to enter reversibly into the catalyzed reaction.

KENTON, H. B. (1939). **The Influence of Inflammation on the Skin Necrotizing Action of Staphylococcus Toxin.**—*Amer. J. Path.* **15.** 185–192. 4 figs. on 1 plate, 1 table. [13 refs.]

K. studied the effect in rabbits of an early inflammatory reaction on the characteristic skin necrotizing action of staphylococcus toxin. Local cutaneous areas about 25 mm. in diameter were sensitized passively by intradermal infiltration with immune serum, 0·1 c.c. sheep or egg albumen antisera being given at 8–10 sites. Some 5–7 hours later staphylococcus toxin was injected into the infiltrated site and a dose of the antigen appropriate to the immune serum given intravenously. A comparison of such animals and suitable controls showed that the effect of the staphylococcus toxin was markedly decreased by the inflammatory reaction, *i.e.* the necrotic lesions were smaller, less severe, and healed more quickly.

The significance of these findings is discussed in relation to apposite work, the view being taken that the decreased necrotic effect is due to dilution and more rapid removal of the toxin from the injection site.—A. W. STABLEFORTH.

NOTTBOHM, H. (1940). Die serologische Gruppendifferenzierung der Streptokokken mit Hilfe der Präzipitation. **[Serological Group Differentiation of Streptococci by Precipitation].**—*Zbl. Bakt. I. (Orig.).* **145.** 369–386. 6 tables. [Numerous refs.]

N. examined 170 strains of streptococci from animal or, in a smaller number of cases, human sources by the group precipitation method and a series of biochemical tests. He used the formamide method of FULLER [*V. B.* **8.** 742.] for the preparation of extracts and found this method of antigen preparation preferable to

the acid extraction method used by LANCEFIELD and others, on the grounds that a smaller mass of streptococci is required and that the extracts are more specific. Immune sera were obtained from rabbits by giving three series of six injections of formalinized and washed culture at weekly intervals, and bleeding by heart puncture under pernocton narcosis. The following strains were used :– one of group A (*Str. pyogenes* of human origin), one of group B (*Str. agalactiae*), four of group C (two *Str. pyogenes* of human and sheep origin respectively, one *Str. equi* and one *Str. dysgalactiae*), and three of group D (*Str. faecalis*, from milk or cow dung).

Of the 170 strains examined 105 could be placed in one of the four groups A, B, C, and D. Twenty strains fell into group A. All were of human origin and had the accepted biochemical characters of this group, including fibrinolysis of human fibrin, mouse pathogenicity, high growth limiting pH, inability to ferment sorbitol etc., but only ten strains fermented trehalose and only 18 lactose.

Forty strains fell into group B; 39 came from mastitis milk and one from a human throat swab. All had the accepted biochemical characters of the group, including splitting of sodium hippurate, inability to lyse fibrin (of cow, horse, or man), a growth limiting pH of 4·6–4·9, and absence of pathogenicity for mice. Three strains were β haemolytic, others α prime, α, or non-haemolytic.

Thirty strains fell into group C; two were of human origin, ten from strangles in horses, 12 from mastitis in cows, and six from other sources. All except those from cows had the β haemolysis, pathogenicity for mice, and high growth limiting pH of the three subgroups long recognized, the two human strains having the typical characters of the so-called human C, the strangles strain those of *Str. equi*, and the other strains those of the so-called " animal *pyogenes*", except that three strains from sheep or pig did not ferment sorbitol. The bovine strains had the characters of *Str. dysgalactiae* (Diernhofer) or the " group II mastitis streptococcus " of MINETT, STABLEFORTH and EDWARDS.

Fifteen strains fell into group D. They were of very varied origin, their outstanding biochemical character being ability to grow at 45°C. in 6·5% NaCl, and on 40% bile blood agar, reduction of 1 : 1,000 methylene blue milk, and a low growth limiting pH. All except a few were non-haemolytic and non-pathogenic for mice. All split sodium hippurate.

N. concludes that the group-precipitation method using formamide extracts is the best method available for the systematic classification of streptococci, and that it is easily and quickly carried out once good sera are available.

—A. W. STABLEFORTH.

FULLER, A. T., & MAXTED, W. R. (1939). **The Production of Haemolysin and Peroxide by Haemolytic Streptococci in Relation to the Non-Haemolytic Variants of Group A.**—*J. Path. Bact.* **49.** 83–94. 5 tables. [15 refs.] [Authors' summary copied *verbatim*].

1. The variants of group A haemolytic streptococci which give non-haemolytic greenish colonies on the surface of aerobic blood agar differ from their haemolytic variants in their later production of haemolysin and in their lower haemolytic titre.

2. If all reducing sugar is removed from the blood agar, or if extra catalase is added to it or if they are grown anaerobically, these green variants yield β haemolytic zones.

3. Peroxide removes the haemolysin from cultures of streptococci owing to a growth-inhibiting effect and has no appreciable effect on haemolysin itself. During this action peroxide is decomposed. Other growth inhibitors cause a similar decrease in haemolysin titre.

MCILWAIN, H. (1940). **The Nutrition of *Streptococcus haemolyticus*. Growth in a Chemically Defined Mixture : Need for Vitamin B_6.**—*Brit. J. exp. Path.* **21.** 25–38. 6 tables. [15 refs.]

As a result of work upon the growth of *Str. haemolyticus* on media containing progressively less unknown material, M. now reports practically optimal growth of the organism on a medium of which all 40 components are chemically defined. A " Richards " strain of the organism, maintained at high virulence, was employed, the various inocula being taken from 18–24 hour growths on fresh broth agar. The various steps in the work are described in detail, and it is pointed out that there are at least three types of nutritional requirements to which the term " growth factor " was first applied :– (1) compounds such as glutamine, vitamin B_6, and pantothenic acid, which appear to be essential to the growth of the organism whatever concentration of other factors is present, and which are replaceable only, if at all, by compounds of

very closely related chemical structure; (2) a substance such as glutathione, which may be replaced by any of a number of other reducing substances; (3) a number of structurally unrelated compounds, the full individual effect of which is observed only in the presence of sub-optimal amounts of substances in classes (1) and (2). Asparagine, betaine, glucosamine, inositol, and certain amino-acids belong to this third category. In addition such factors as the size of the inoculum are important, *e.g.* the requirement of *Str. haemolyticus* for glutamine is much more strict when the inoculum is small, whereas with large inocula glutamine is replaceable by glutamic acid. Again, if glutamine is present, but in traces only, otherwise inactive compounds such as glutamic acid can appear as growth factors.—A. N. WORDEN.

WIGHT, A. E. (1939). **The Progress and Status of Co-operative Tuberculosis Eradication Work.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass., 1938.* pp. 221–226. [See also *V. B.* **9.** 674].

ANON. (1939). **Statistical Tables and Map Showing Progress of Tuberculosis Work among Livestock in the United States.** pp. 12. 16 tables. Washington, D.C.: United States Department of Agriculture, Tuberculosis Eradication Division. [fcp] [Mimeographed].

I. During the fiscal year ending June 30th, 1938, approximately 14,100,000 cattle were tuberculin tested, the percentage of reactors being 0·6, the lowest since 1917. In localities where retesting only was done, the number of reactors was as low as 0·3%.

A total of $7,200,000 appropriated from federal, state, territorial, and county funds, was used for compensation and operating expenses. The number of accredited herds remained about the same as in the previous two or three years, there being 267,415 such herds containing 3,790,000 cattle in October 1938.

South Dakota was added to the list of states in which all the counties are in the modified TB.-free area. During the year ending in November 1938, 31 counties were added to the list of those in the modified TB.-free area, the incidence of TB. being less than 0·5%. Twenty-seven municipalities in Puerto Rico were also given the same status, and tuberculin testing of all cattle in the Virgin Islands was completed. Approximately 176,000 cattle for inter-state shipment were tested during the fiscal year, there being only 95 reactors (0·05%).

The number of negatively reacting cattle found to be infected P.M. was less than in the previous year. Out of 10 million cattle slaughtered under federal supervision during the fiscal year, 11,668 (0·1%) were infected, and 2,800 were condemned as unfit for food or passed for cooking purposes. TB. was found P.M. in 2,900,000 (9·1%) out of 32,450,000 pigs. 12,423 (0·4%) were condemned as unfit for food and 13,665 (0·4%) passed for cooking purposes.

Johne's disease was found to exist in ten states, in 7·2% of 6,000 cattle tested.

The combined state and federal payments received by owners of slaughtered cattle averaged $35.00, the maximum federal payment being $25.00 for grade cattle and $50.00 for registered pure bred cattle. Since July 1938, however, federal payment has been limited to one-third of the difference between the appraised value and the salvage.

Avian TB. remained a serious problem. About 137,000 flocks were examined and infection reported on 7,600 farms. In some states regulations exist prohibiting entry of fowls which may carry the disease.

In conclusion, W. stressed the need for adequate follow-up measures and for testing at proper intervals in the modified area with prompt removal of reactors.

II. In July 1923, 17 counties in the U.S.A. were designated as the first modified accredited [M. A.] areas (incidence of infection less than 0·5%). By October 1939, the M. A. areas included 3,065 counties, 77 municipalities in Puerto Rico, and three islands in the Virgin Islands. Area work was in progress in the six remaining counties (of California) not in the M. A. area.

Between 1917 and 1939 a total of 18,242,186 herds comprising 217,491,705 cattle were tuberculin tested; there were 3,711,858 reactors, averaging 1·7%. The number of cattle tested rose from 20,101 in 1917 to 25,237,532 in 1935, decreasing to 11,186,805 in 1939. The percentage of reactors was 3·2% in 1917, was highest in 1918 (4·9%), and lowest in 1939 (0·5%).

Tests made on inter-state cattle showed the number of reactors in 1921 to be 1·5%, dropping to 0·01% or less in 1939.

At the end of the fiscal year 1918, there were 204 accredited herds comprising 6,945 cattle; by 1939 they numbered 262,972 herds comprising 3,829,941 cattle. In this year also there

were 5,735,546 once-tested free herds with 53,400,005 cattle, and 6,384,948 (61,010,021 cattle) herds under supervision.

The number of premises found to be infected rose from 13,103 in 1922 to 22,181 in 1939, the percentage, however, dropping from 11·2–3·0, being highest in 1926 (12·0).

Detailed statistics for each state are given in the tables. Meat inspection figures are also given. Of 107,250 reactors slaughtered in 1923, the carcasses of 11·9% were condemned and of 1·4% sterilized. Corresponding figures for 1939 are 63,616 slaughtered, 5·7% condemned, and 0·5% sterilized. Non-reacting cattle slaughtered numbered 7,887,051 in 1916 and 9,515,754 in 1937, with respectively 2·35% and 0·11% carcasses retained, and 0·53% and 0·3% condemned and sterilized.

Of 37,702,866 swine carcasses in 1921, 0·26% were sterilized and 0·17% condemned. For 1939 the figures are 38,656,537 carcasses with 0·04% sterilized, and 0·03% condemned.

Between 1925–1934 over 246,000,000 fowls were examined, an average of 4·4% being infected. During 1938–39 10,856 flocks comprising 1,383,305 birds were examined, 1,108 flocks were clinically affected, and 6,443 birds in 704 flocks gave positive reactions to the tuberculin test. Figures are also given showing the average salvage rates, federal and state indemnities etc. between 1917–39.

—. (1940). **Report of the Committee on Tuberculosis.**—*Proc. 43rd. ann. Meet. U.S. Live Stk sanit. Ass. 1939.* pp. 299–300.

The committee reported that all the herds of cattle in the U.S.A. had been tuberculin tested and that there existed only six counties in the whole federation which were not yet classed as " modified accredited areas ". Bovine TB. had been practically eradicated after a 22 years' campaign. The committee drew attention to the need for cancelling or altering some of the TB. regulations, but the necessity to continue with periodic testing remains of the greatest importance.—J. E.

KANAUKA, K. (1937). Die Bekämpfung der Rindertuberkulose. **[Control of Bovine Tuberculosis].**—*Ref. III Balti. Valsty. vet. Kongr. 1937.* pp. 3–22. 4 tables. [Numerous refs.] [In German : Russian summary].

In Latvia, active steps to combat bovine TB. were first taken in 1930, when a policy of tuberculin testing and slaughter of clinically affected animals was introduced. In 122 herds tested in that year, there were 13·7% reactors and 3·3% clinical cases. In 1937 the corresponding figures were 8% and 0·5% in 2,881 herds. In accordance with general experience it has been found that the frequency of reactors and clinical cases is higher in the larger herds (26–50 animals), than in the smaller herds (11–25). Although progress in eradicating the disease is being made, the area under control is only 2% of the country, containing only 6% of the herds.

K. discusses the use of the intradermal tuberculin test, and while giving support to its reliability, states that macroscopic evidence of disease may not always be found in positive reactors, while advanced cases of disease do not always react to the test. The allergic reaction to bovine TB. may not be specific, since cross-reactions due to infection with avian or human tubercle bacilli may be elicited. The inter-communicability of these infections is discussed with special reference to those caused by the bovine and human types of bacilli.

—S. J. EDWARDS.

INNES, J. R. M. (1940). **The Pathology and Pathogenesis of Tuberculosis in Animals Compared with Man.**—*Vet. J.* **96.** 391–407. [9 refs.]

This paper deals with bovine TB. and should be read in conjunction with two previous papers by the same author [*V. B.* **10.** 821]. The article takes the form of a critical review of the modern conceptions of the pathogenesis of TB. in calves and adult cattle. A special section is devoted to udder TB. The author considers that in many respects calfhood infection resembles TB. of children and that there are many parallels between the disease in the adult bovine and in the adult human being.—J. S. P.

SANSONETTI, P. (1938). La tubercolosi dei carnivori domestici e il pericolo di contagio dell'infezione all'uomo. **[Tuberculosis in Domestic Animals].**—*Lotta c. Tuberc.* **9.** 762. [Abst. in *Amer. Rev. Tuberc.* **42.** No. 3. 32, copied *verbatim*].

It has long been known and proved that dogs and cats are easily infected by both human and bovine tubercle bacilli. Previous to 1925, cases were rarely found, but the infection is steadily increasing. In Italian veterinary schools today it is found that 1·45 per cent of cats and 0·60 per cent of dogs examined show tuberculosis ; these percentages are obviously

below the true infection rates, because but few animals are brought in for examination. Nain and Prudhomme established by autopsy a case of miliary tuberculosis in a dog belonging to a watchman of an abattoir. The dog had fed on offal and on fresh milk from cows awaiting slaughter. Culture and inoculation of material from this dog disclosed tubercle bacilli of bovine type. The dog had died after an hour of acute illness, but old lesions were also found at autopsy and the dog had been in noticeably poor condition for some time. Strict measures should, therefore, be taken to prevent dogs from roaming on the premises of abattoirs, meat markets, etc. A review of the literature discloses that Italian observers have published articles on this subject since 1882. A recent study (1936) places the amount of infection at from 2 per cent to 15 per cent. The conclusions are that infection between domestic animals and man is reciprocal; that animals are usually infected through ingestion of infected food; that tubercle bacilli are eliminated in considerable quantity through secretions and excretions. The elimination of strays and of animals from the homes of the tuberculous would be an important addition to the campaign against tuberculosis.

PABIJANSKAS, A. (1940). Apie kiauliu tuberkuliozes bakteriju tipus. **[Types of Bacteria in Tuberculous Pigs]**.—*Vet. ir Zootech., Kovno.* **17.** 9–18. [Numerous refs.] [Abst. from German summary].

Lymph nodes from 316 tuberculous pigs were examined culturally and by animal inoculation. In 128 cases both tests gave negative results; in 11 cases no useful result was obtained, and in 177 cases TB. was diagnosed—the human type in 3·4%, the avian type in 34% and the bovine type in 60%, whilst a mixed avian and bovine infection was present in 2·8%.—J. E.

BRANDT, A. (1940). Bacilltypene ved menneske-tuberkulose i Norge. **[Types of Tubercle Bacilli in Human Tuberculosis in Norway]**.—*Norsk VetTidsskr.* No. 6. p. 234. [Abst. from abst. in *Skand. VetTidskr.* **30.** 849].

A detailed description is given of B.'s method of preparing cultures on Petragnani's solid medium with or without glycerin, and of the cultural characters of the three types of tubercle bacilli grown thereon.

It is stated that TB. in cattle is rare in Norway (0·15% among 1½ million cattle slaughtered from 1931–38), but is more common in pigs and poultry. Of 160 tuberculous pigs examined, 80% were infected with the avian type bacillus, 17·5% with the human type, and 2·5% with the bovine type.

Among 1,224 specimens of sputum etc. from cases of human pulmonary TB., only two were of the avian type infection and none of the bovine type; there were two cases of bovine type infection among 265 cases of bone and joint TB., one bovine type among 23 cases of lymph node TB. and one avian type among 42 cases of skin TB., all the remainder being of the human type.—J. E.

TERPLAN, K. (1940). **Anatomical Studies on Human Tuberculosis.**—*Amer. Rev. Tuberc.* **42.** Suppl. No. 2. pp. 176. Numerous figs., plates, tables. [Numerous refs.]

T. has made a careful anatomical study of material from 698 children and 289 adults with a view to a determination of the sites of the primary TB. complex and also the proportion of reinfection with tubercle bacilli of exogenous origin. The methods used consisted of a combination of detailed radiological examination, anatomical dissection, and a complete histological analysis of the lesions found.

—R. E. GLOVER.

SAENZ, A., & CANETTI, G. (1940). Acquisitions nouvelles sur la bactériologie du lupus vulgaire tuberculeux. **[New Findings on the Bacteriology of Tuberculous Lupus Vulgaris]**.—*Paris méd.* **30.** No. 5–6. 58–62. 1 table. [Abst. in *Tubercle, Lond.* **21.** 302, copied *verbatim*].

In this study, undertaken at the Pasteur Institute, the authors describe their researches on the virulence of 31 cultures from cases of lupus. Of these, only six presented normal virulence, four of which showed all the characteristics of the human type of bacillus and two of bovine type. Ten other lupoid cultures (nine human and one bovine) were markedly attenuated; but the most striking fact noted was that the remaining 15 cultures (48 per cent of the whole number) were not only attenuated but proved avirulent for the guinea-pig, the pathogenic effect being limited to a very small abscess, usually sooner or later absorbed, and to a minute adenopathy in the satellite glands. At the same time a notable sensitization to tuberculin was observed in the inoculated animal, evidenced by a strongly positive allergy which lasted for many months and sometimes

throughout the whole life of the animal. The writers, after describing their technique—to which they attach great importance—conclude that the study has shown the possibility of isolating from even extensive and mutilating lupoid lesions, strains of mammalian tubercle bacilli practically avirulent but which at the same time possess a tuberculin fully as toxic as that obtained from highly virulent strains. It follows, therefore, that in spite of the absence of a picture of generalized tuberculosis in the inoculated guinea-pig, the conclusion must not be drawn as to the negativity of an inoculation of lupoid tissue without having previously made a culture from the glands at the site of inoculation in the experimental animal. The study has shown, further, that provided the technique set out in detail be followed, the isolation of strains from lupoid cultures is as simple as that of tubercle bacilli derived from any other tuberculous source whatever. This finally disproves the belief too long held as to the technical difficulty of demonstrating tubercle bacilli in the lesions of lupus.

It is, moreover, logical to believe that with this particular technique similar discoveries may be made in the case of other skin lesions of which the tuberculous aetiology may still be in doubt, by finding greatly attenuated strains which ordinary methods have failed to discover.

SAENZ, A., & CANETTI, G. (1939). Fréquence et caractères de l'infection bovine chez les lupiques en France. [**Bovine Type Tuberculosis Infection in Human Cases of Lupus**].—*C. R. Soc. Biol. Paris.* **130.** 1526–1529. [9 refs.]

S. states that the incidence of human TB. due to the bovine type of *Mycobacterium tuberculosis* is insignificant in France [*V. B.* **9.** 291]. The authors now record their findings in lupus. They observed two cases due to bovine types as compared with 22 others due to the human type of *Mycobact. tuberculosis*, whereas in England, Germany, and Denmark anything from one-third to one-half of the lupus cases have been recorded as due to be bovine type. The protocols of the two cases and the methods of identification of the organisms (L15 and L23) are detailed, correct diagnosis being rendered more difficult because cultures of both the human and bovine type become attenuated by long contact with skin.

—C. V. WATKINS.

STEINBACH, M. M., & DUCA, C. J. (1940). **Experimental Tuberculosis in the Cotton Rat** (*Sigmodon hispidus littoralis*).—*Proc. Soc. exp. Biol., N.Y.* **44.** 288–290. [4 refs.]

As this animal has been shown to be susceptible to the virus of poliomyelitis and resembles the g. pig in its susceptibility to *Trypanosoma equiperdum* infection, to the toxin and also to infection with the bacilli of *Corynebacterium diphtheriae*, its behaviour in relation to TB. was studied.

Experimental infection appeared to show that the cotton rat occupies a position midway between the albino rat and the g. pig in its susceptibility to bovine tubercle bacilli, but, like the albino rat, it is insensitive to skin-test doses of tuberculin and tolerates large amounts injected subcutaneously.—GWILYM O. DAVIES.

COHN, M. L. (1939). **Preservation of Tubercle Bacilli.**—*Amer. Rev. Tuberc.* **40.** 99–108. 4 tables. [8 refs.] [Author's summary copied *verbatim*].

Desiccated human (virulent and avirulent), bovine (virulent), and avian (virulent) tubercle bacilli almost completely retain viability for three years at refrigerator temperature, while natural cultures survive under the same condition of temperature only about six months to one year (occasionally two years). The loss of viability of the desiccated cultures of these same strains of tubercle bacilli is much more rapid at incubator temperature, being almost complete at six months to one year; while at room temperature, they survive a little better than at incubator temperature.

The loss of viability of tubercle bacilli is primarily a function of the temperature at which they are stored, regardless whether they are desiccated or natural. The rate of loss of viability of cultures of tubercle bacilli is greater in the presence of oxygen, less so in the presence of air and least in nitrogen. Desiccation, although a minor factor, aids in maintaining the viability of tubercle bacilli. Desiccation can remove as much as 70 to 75 per cent. of the water (and volatile materials) from the cultures of tubercle bacilli without appreciable detrimental effect on the viability. Aside from the preservation of well grown broth cultures of mammalian tubercle bacilli (some of the bacilli remaining viable for over twelve years, as described by us in 1933), cultures of strains of mammalian and avian tubercle bacilli can be preserved in viable form for over three years when desiccated and sealed in air or nitrogen

and maintained at refrigerator temperature. The latter method possesses advantages over the former in that the specimens occupy little space and are readily transportable.

POZZI, G. (1940). La virulenza del bacillo di Koch e sua patogenicità. **[The Virulence of the Tubercle Bacillus and its Pathogenicity].**—*Tubercolosi, Roma.* **32.** 75. [Abst. in *Tubercle, Lond.* **21.** 309, copied *verbatim*].

Pozzi emphasizes the difficulty in defining the concept of the virulence of the tubercle bacillus, and shows how inaccurate it is to regard it as connected with one or more of the factors which constitute the elements determining the virulence. To estimate the virulence the mere chemical composition, the possibility of its persistence *in vivo* or the possibility, rapidity and abundance of reproduction are not enough; it must also be realized that the tubercle bacillus always has a pathogenic action which is dependent on allergic and immunological reactions which the tuberculous infection produces in the system and which produce a great variety of clinical symptoms.

FREEDLANDER, B. L. (1940). **Bacteriostatic Action of Various Wetting Agents upon Growth of Tubercle Bacilli** *in vitro.*—*Proc. Soc. exp. Biol., N.Y.* **44.** 51–53. 1 table.

As wetting agents in general possess the properties of penetrating and emulsifying surface films of fatty substances to a high degree and are also powerful surface tension reducers, the action of three of these agents on the growth of tubercle bacilli was tried. "Zephiran", a mixture of high molecular alkyl-dimethyl-benzyl-ammonium chlorides, proved to be the most efficient; it produced complete inhibition of growth in a dilution of 1 : 80,000 and retarded growth in dilutions as high as 1 : 400,000. "Nacconol NR", an alkyl aryl sulphonate, and "aerosol OT—100", an ester of a sulphonated bi-carboxylic acid, prevented growth in 1 : 5,000 and retarded growth in a dilution of 1 : 40,000. Although the bacteriostatic action of "zephiran" against tubercle bacilli is high, its bactericidal action is low. The former action is probably due chiefly to its molecular structure.—GWILYM O. DAVIES.

OLCOTT, C. T. (1939). **The Reaction to Killed Tubercle Bacilli in Normal and Immunized (Sensitized) Rabbits.**—*Amer. J. Path.* **15.** 287–298. 3 figs. [8 refs.]

[Author's conclusions copied *verbatim*].

When heat killed tubercle bacilli are injected into the peritoneal cavity of rabbits, formation of tubercles and of tuberculous tissue occurs more quickly and becomes more advanced in animals that have received preliminary intracutaneous or subcutaneous injections of killed tubercle bacilli than in their unprepared controls. The difference is greatest 3 or 4 weeks after intraperitoneal injection when the lesions in prepared and in control animals are at their height. After 5 weeks no difference in the two groups is evident and later the lesions in both regress.

The extent of tuberculous lesions is greater in the prepared animals which are both immunized and sensitized than in their controls, but there is no close correlation between sensitization measured by the tuberculin reaction and the extent of tuberculous lesions.

Heat killed tubercle bacilli cause necrosis with the characteristics of caseation both in control (unprepared) animals and in those that have received preparatory injections, but it is more frequently found in the latter. Caseation is in general more advanced in sensitized animals but there is no exact correlation between sensitization and caseation.

When killed tubercle bacilli are injected into the peritoneal cavity, tubercle-like nodules composed of epithelioid cells are often found in the retrosternal lymph nodes, spleen, liver and lungs of both immunized and control animals.

FREUND, J., CASALS-ARIET, J., & GENGHOF, Dorothy S. (1940). **The Synergistic Effect of Paraffin-Oil Combined with Heat-Killed Tubercle-Bacilli.** — *J. Immunol.* **38.** 67–79. 1 table, 3 graphs. [14 refs.]

Earlier work demonstrated that intense skin sensitivity could be induced in monkeys with liquid paraffin containing heat-killed tubercle bacilli [see *V. B.* **11.** 173.], but the injection of the bacilli was followed by extensive local lesions which often suppurated.

The experiments reported here showed that when groups of rabbits were repeatedly injected with constant amounts of heat-killed tubercle bacilli suspended in varying amounts of liquid paraffin (0·03, 0·002, 0·0005, and 0·0001 c.c. respectively per injection in four different groups), the amount of sensitivity and antibody formation induced was proportional to the amount of liquid paraffin used and the size of

lesions produced. The results also showed that it is possible to produce considerable synergistic effect with liquid paraffin (injected into the subcutaneous tissue) without causing extensive or ulcerating lesions. It is concluded that tubercle bacilli incorporated in liquid paraffin resist destruction, maintain a persistent monocytic reaction, and cause fibrous encapsulation.

—R. ALLCROFT.

KRANEVELD, F. C., & DJAENOEDIN, R. (1939). Onderzoek over de resistentie van met het Corynebacterium Preisz-Nocardi (ovis) geinfecteerde caviae tegen miltvuur. [**Resistance to Anthrax of Guinea Pigs Infected with** *Corynebact. ovis*].—*Ned.-ind. Bl. Diergeneesk.* **51.** 29–34. 2 tables. [11 refs.] [English and German summaries. Abst. from English summary].

G. pigs that had been injected either subcutaneously or intramuscularly with the PREISZ-NOCARD bacillus and had developed characteristic lesions proved to be as susceptible to infection with the anthrax bacillus as were healthy control g. pigs.

DE MENDONÇA MACHADO, A. (1938). Pasteureloses e pasteurelas: estudos feitos com estirpes portuguesas. [**Studies of Portuguese Strains of Pasteurella**].—*Repos. Lab. Pat. vet., Lisboa.* **4.** 107–119. 2 tables. [14 refs.] [English and French summaries].

The author attempted to differentiate various species of *Pasteurella* found in Portugal by their cultural characteristics. He used 70 strains of the following organisms:—*P. boviseptica*, 7; *P. oviseptica*, 1; *P. suiseptica*, 35; *P. lepiseptica*, 5; *P. aviseptica*, 21, and one unspecified strain from a leopard. All strains produced indole and in no case was gas produced from carbohydrates. Acid was formed in galactose, saccharose, glucose, and mannite. Dulcite, isodulcite, adonite, salicin, inulin, lactose, and inosite were unaltered. It was found, however, that with xylose, arabinose, raffinose, and maltose some strains produced acid, while others did not, *e.g.* five strains of *P. boviseptica* produced acid with xylose whereas two did not, and two strains of *P. suiseptica* produced acid with raffinose, whereas 33 did not. The acid-producing characteristics of some strains were altered after passage through pigeons.

It is concluded that differentiation by these methods is unsatisfactory.—MILLER WATSON.

I. GRAHAM, R., HESTER, H. R., & LEVINE, N. D. (1940). **Studies on** *Listerella* **I. A** *Listerella* **Strain Isolated from a Premature Bovine Fetus.**—*J. infect. Dis.* **66.** 91–96. 3 figs., 1 table. [7 refs.]

II. GRAHAM, R., HESTER, H. R., & LEVINE, N. D. (1940). **Studies on** *Listerella* **II. Field Outbreaks of Listerellosis in Sheep and Cattle.**—*Cornell Vet.* **30.** 97–111. 2 figs., 1 table. [Numerous refs.]

III. GRAHAM, R., DUNLAP, G. L., & LEVINE, N. D. (1940). **Studies on** *Listerella* **III. Experimental Listerellosis in Domestic Animals.**—*Ibid.* 268–290. 2 figs., 3 tables. [Numerous refs.]

IV. GRAHAM, R., MORRILL, C. C., & LEVINE, N. D. (1940). **Studies on** *Listerella* **IV. Unsuccessful Attempts at Immunization with Living and Dead** *Listerella* **Cultures.**—*Ibid.* 291–298. 1 table. [2 refs.]

I. The authors studied the abortofacient properties of a *Listerella* strain obtained from an aborted bovine foetus. The organism was inoculated intravenously into a pregnant heifer, and after ten days of fever and inappetence she aborted. Listerella were isolated from the foetal membranes, but they could not be demonstrated in the maternal genital tract or in its discharges. The heifer recovered. Pregnant rabbits, g. pigs, and swine inoculated with infective material did not abort. The inoculation of the organism into a non-pregnant heifer caused illness. Death followed inoculation into a six-week-old pig. Conjunctivitis resulted from instillation of the organisms into the conjunctival sacs of rabbits and g. pigs. Intravenous inoculation of the strain in chickens caused extensive myocardial necrosis.

II. Descriptions of listerella encephalitis or encephalomyelitis in three flocks of sheep and three herds of cattle are given. Clinical symptoms, P.M. findings, and epidemiology of the disease are discussed. The strains of *Listerella* obtained from these outbreaks were similar to those isolated by JUNGHERR [*V. B.* **8.** 415.] and SEASTONE [*V. B.* **6.** 106].

Many different organs were cultured on autopsy but the organisms were only obtained from the central nervous system, usually only from the medulla. In experimentally infected animals listerella were also isolated from the blood stream. In natural cases there were no gross lesions of the central nervous system,

although there may have been an excess of cerebrospinal fluid. Leucopenia and leucocytosis were observed in the natural disease. This may be accounted for by the blood counts being performed at different stages of the disease. In experimental animals a leucocytosis was sometimes followed by a leucopenia. There was no evidence that a monocytosis was characteristic of the disease in ruminants. Listerella encephalitis does not affect the majority of the animals in a flock, 10–15% being the usual figure. The mortality in clinically affected animals was high although a few mild cases recovered. Cases may occur at irregular intervals or within a short period. The time of incubation is not definitely known, but there is evidence that it may be as long as 18 days.

III. Attempts were made to infect various species of domestic animals by a variety of routes. Intracerebral inoculation of an ovine strain of *Listerella* caused death in a sheep, heifer, horse, and in chickens. Intravenous inoculation was fatal to a sheep, a cat, a young pig, and chickens. Conjunctivitis and keratitis occurred in the cat. Other animals of the same species and a steer, horse, and dog recovered from the same type of inoculation. The symptoms and P.M. appearances in a lamb infected experimentally were similar to those in the naturally occurring disease.

Conjunctival exposure to the organism caused conjunctivitis, and in some cases keratitis, in sheep, horses, and cattle. Reaction was slight in chickens. The direct and repeated introduction of the organism into the stomachs of these various animals produced little effect. Sheep in immediate contact with an inoculated lamb failed to contract the infection. From their studies of the blood of natural and experimental cases the authors state that a monocytosis is not a feature of the disease in ruminants or horses.

IV. The immunizing power of formalin-killed broth cultures of *Listerella* was tried. Repeated subcutaneous inoculations of such a vaccine failed to protect rabbits against intravenous exposure to the living organisms. The result was similar in sheep inoculated in the same way. Single or repeated doses of this vaccine given subcutaneously did not protect chickens against intracerebral inoculation of living listerella. A high titre bovine antiserum and the vaccine failed to immunize rabbits and g. pigs against conjunctival and subcutaneous exposure.—D. L. Hughes.

Biester, H. E., & Schwarte, L. H. (1940). **Listerella Infection in Swine.**—*J. Amer. vet. med. Ass.* **96.** 339–342. 2 figs. [12 refs.]

A *Listerella* organism was isolated from pigs. The infection was characterized by varying degrees of incoordination, trembling, and a peculiar stilted gait of the forelegs. The temperature was sometimes elevated. The condition is distinct from the clinically recognized field condition termed " shivering pigs " which is believed to be hereditary.

No gross changes were observed macroscopically, but histological examination showed a marked meningitis, focal infiltration, and perivascular cuffing. Encephalitis could only be reproduced in swine and rabbits by intracerebral inoculation. It is pointed out that there may be a danger in feeding pigs with the carcasses of cattle, sheep, and swine which have succumbed to listerella infection.—J. S. P.

Castelo, M., & Salsamendi, R. C. (1938). Salmonela Newington en el perro. [*Salmonella newington* **in the Dog**].—*An. Fac. Vet., Montevideo.* No. 4. pp. 359–361.

A case record and description of the causal organism of *S. newington* infection in a dog which died of septicaemia.—Miller Watson.

Boivin, A. (1939). Sur l'existence d'un antigène somatique non protéique commun aux variantes smooth et rough des *Salmonella.* [**The Existence of a Non-Protein Somatic Antigen Common to the R and S Variants of** *Salmonella*].—*C. R. Acad. Sci., Paris.* **209.** 494–496. [1 ref.]

R strains of typhoid bacilli were treated with trichloracetic acid in the cold followed by centrifugation and dialysis. The dialysate was extracted with 5–6 vols. of acetone and the product is non-dialysable, non-centrifugable and gives no protein reactions. On hydrolysis sugar is liberated and small quantities of what is apparently a fatty acid. It is non-toxic for mice, but when injected into rabbits it induces the formation of antibodies which are distinct from the antibodies associated with H, O, and Vi antigens. The antigenic substance can also be recovered from smooth strains of typhoid bacilli, whether motile or non-motile, mixed with O and Vi antigen. It appears to be common to S and R strains and exists also in other salmonella bacteria, *e.g.* in *S. paratyphi* A, B,

and C and also *S. typhi-murium* and *S. enteritidis*. No trace of it has been found in three strains of *Bacterium coli* or in two strains of dysentery bacilli. It is apparently a common salmonella antigen mixed up with specific O antigens and in some species with Vi antigen. It has been called provisionally an R antigen. When used as an immunizing agent it does not protect mice against typhoid infection nor does the corresponding serum give a passive immunity.—R. LOVELL.

KENDALL, G. C. (1940). **Bang's Disease in the Virgin Islands.**—*N. Amer. Vet.* **21.** No. 7. 405.

Of 1,498 cattle tested by the agglutination reaction for *Brucella abortus* infection in the Virgin Islands, 99·58 % gave a negative result. —R. O. MUIR.

PATELLI, E. (1939). Indagini sull'andamento stagionale della infezione brucellare nei bovini e nelle pecore in rapporto all'andamento stagionale della brucellosi nell'uomo. **[Brucella Infection in Cattle and Sheep in Northern Italy and Its Connexion with Human Infection].**—*Igiene mod.* **32.** 290–294. 2 tables, 1 chart.

Blood agglutination tests were made on 1,252 slaughter cattle (about 100 a month) at Pisa throughout 1938, on 500 slaughter sheep during the four months preceding April 1938, and on a flock of 20 sheep (at monthly intervals throughout 1938). Most positive results were obtained in cattle in May and in sheep in June and again in November, whilst the numbers of cases of human brucellosis in the same area also reached their maximum in June, there being in all cases a gradual rise to and a fall from these peaks. 78 % of 107 cattle reacted in May and 55 % of the sheep in June.—J. E.

SÁ VIANA CONTE, H. E., DE MENDONÇA MACHADO, A., & BARREIROS NUNES, L. H. (1938). Ensaios de vacinoterápia, por via intravenosa, em bovinos infectados pela Br. abortus bovis. **[Intravenous Vaccinotherapy for *Brucella abortus* Infection in Cattle].**—*Repos. Lab. Pat. vet., Lisboa.* **4.** 79–89. 4 tables. [7 refs.] [English and French summaries].

A record of intravenous injection into cows of carbolized *abortus* vaccine. It is stated that temperature reactions that developed in the cows could be correlated with the agglutination reactions of the animals. The vaccine was not of value for control purposes.

LIVE, I. (1940). **Studies with *Clostridium chauvoei* (Blackleg) Aggressin.**—*J. Immunol.* **39.** 137–162. 7 tables. [Numerous refs.] [Author's summary copied *verbatim*].

1. Natural aggressin, culture filtrate and sonic extract of *Cl. chauvoei* reduced phagocytosis *in vitro* when present in the phagocytic mixtures. By allowing the aggressin to act upon serum and upon leucocytes it was shown that the inhibition of phagocytosis was due to fixation of opsonins and not to a direct action upon the leucocytes.

2. The agglutinative titers of two antisera were diminished when the different dilutions of the sera were mixed with equal quantities of aggressin, filtrate or extract and incubated for one hour prior to setting up the test.

3. Three pairs of rabbits were immunized by intravenous injection of washed suspensions of live organisms, formalin-killed organisms and culture filtrate, respectively. The antisera thus produced were used in complement-fixation and precipitative tests, and they all gave positive reactions with culture filtrates, natural aggressin and extracts of *Cl. chauvoei*. The fact that suspensions of washed organisms free of by-products of growth, and particularly suspensions of washed formalin-killed organisms, stimulated the production of antibodies which reacted with antigen in aggressin and filtrate, proves that the latter contain soluble material from disintegration of the bacterial cells.

BOUCHET, G., & BOUCHET, A. (1939). Contribution à l'étude du botulisme. **[An Outbreak of Botulism in Horses].**—*Bull. Acad. vét. Fr.* **12.** 387–391.

An outbreak of botulism on a well managed farm is described. One horse died 24 hours after showing symptoms; the following week two horses died under the same conditions as the first. A few days later a fourth case occurred in a draught horse in very good condition, with incoordination of gait and a rapid and weak pulse. Investigations into the food and water supplies were negative, and four more horses died while the investigations were in progress. A stableman stated that, before the death of the first horse, he had found a dead cat on the hay given daily to the horses. On this fact, but without any corroborative evidence, the authors base their diagnosis of botulism.—L. T.

PRÉVOT, A. R. (1940). Études de systématique bactérienne. V.—Essai de classification

des vibrions anaérobies. **[Bacterial Nomenclature. V.—Classification of the Anaerobic Vibrios].**—*Ann. Inst. Pasteur.* **64.** 117–125. 2 tables. [5 refs.] [Translation of author's summary]. [For previous parts, see *V. B.* **10.** 164].

1. The anaerobic vibrios are not a homogeneous group, some being saprophytes or parasites, non-sporulating and of heterotrophic (haplometatrophic) nutrition, and others being free sporulating forms, of autotrophic (chemotrophic) nutrition, and reducing sulphates.

2. Thus they cannot all be classed in the same genus, nor in the same family. The asporous forms are placed in the genus *Vibrio* Muller (which KLUYVER and VAN NIEL place in the tribe Spirilleae, family Pseudomonadaceae Winslow and others).

Given the very marked morphologic individuality of this group, we should incline rather to give them taxonomic autonomy as a new family, the Vibrionaceae, including only Gram-negative species and belonging to the order Spirillales, third order of the non-sporulating Eubacteriales, the first two orders being the Micrococcales and the Bacteriales.

3. The creation of the genus *Sporovibrio*, Starkey 1938, is accepted for the sporulating forms, but this genus cannot remain beside the genus *Vibrio*, in the family Vibrionaceae which includes only asporous forms. For this genus, therefore, the new family Sporovibrionaceae is proposed, which fits into the order Bacillales (sporulating Eubacteriales).

4. A classification of those species within these two genera is proposed, together with a key for their identification.

SALLE, A. J., & MORRISON, J. L. (1939). **Studies on the Virulence of Organisms.**—*J. Immunol.* **36.** 385–394. 3 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

1. Minced chick embryonic tissue suspended in Tyrode's solution (1 : 20) rapidly reduces the virulence of type III pneumococcus and type II meningococcus. 2. The reduction in virulence appears to be due to the presence of some substance or substances present in embryonic chick tissue. 3. Minced chick embryo medium presents an admirable method for the cultivation and attenuation of the above named organisms.

DAVIS, W. A., & MCCLUNG, L. S. (1940). **Aspergillosis in Wild Herring Gulls.**—*J. Bact.* **40.** 321–323. 1 fig. [3 refs.]

An outbreak is recorded of aspergillosis in wild herring gulls at Boston, U.S.A. The disease, which was highly fatal, affected birds exposed to decaying vegetation on mud flats in the harbour. In all cases tubercle-like lesions were present in the lungs. From these lesions, pure cultures of *A. fumigatus* were isolated. In a few birds lesions also occurred in the peritoneum and in the liver and kidneys.—D. D. O.

LAMANNA, C. (1940). **Relation Between Temperature Growth Range and Size in the Genus *Bacillus*.**—*J. Bact.* **39.** 593–596. 2 tables. [2 refs.]

L. has found that the large-celled species of the genus *Bacillus* have lower minimum and maximum growth temperatures than have the smaller-celled species.—D. L. HUGHES.

MASTROFRANCISCO, N. (1940). Contribuição para o estudo do "favus" aviário. ("Tinea cristae galli"—Crista branca). **[Favus in Fowls].**—*Rev. industr. Anim.* **3.** No. 1. 146–156. 10 figs. [7 refs.] [English and French summaries].

A detailed description of a case of favus in a domestic fowl and of the morphology of the causal agent, *Achorion gallinae*.—M. WATSON.

DISEASES CAUSED BY PROTOZOAN PARASITES

GALLO, P. (1938). Le tripanosomiasi animali nel Nicaragua. **[Animal Trypanosomiasis in Nicaragua].**—*Arch. ital. Sci. med. colon.* **19.** 344–349. 1 fig.

Horses and cattle in Nicaragua are sometimes infected with a form of *T. evansi*, the diseases being known locally as "murrina" and "secadoro" (dry horn) respectively. Horses develop acute, subacute or chronic infections, whilst in cattle the disease is only rarely acute. Attempts to transmit the infection were negative with mosquitoes and ticks, occasionally positive with *Stomoxys*, and much more commonly positive with tabanids whose bite may be infective 20 hours after feeding on an infected animal. It was found that blood of apparently healthy animals might contain trypanosomes, and it appears that such animals form the reservoir for infection. For treatment naganol is recommended in horses, and alternate injections of naganol and tartar emetic in cattle. *T. theileri* was encountered in

cattle infected with haemorrhagic septicaemia, such animals exhibiting nervous symptoms in addition to the usual symptoms of haemorrhagic septicaemia. The parasites were rare in the blood, but could be demonstrated in the lymph nodes where they occurred as leishmanial, crithidial, leptomonal, and plasmodial forms. Parasites were also found in a centre of degeneration in the cerebrum of an animal infected with haemorrhagic septicaemia.

From examination of biting insects it was concluded that transmission might be mechanical by tabanids or cyclical by ticks. The organism does not appear to be pathogenic, but may reduce resistance to other diseases.

—U. F. RICHARDSON.

FRULLINI, P. L. (1938). Tripanosomiasi e piroplasmosi nei camelli della Dancalia. **[Trypanosomiases and Piroplasmoses in Camels at Dancalia, Italian East Africa].** —*Arch. ital. Sci. med. colon.* **19.** 340–343.

In the examination of camels for trypanosomiasis at Dancalia, intracorpuscular parasites resembling piroplasms were encountered. These bodies were sometimes associated with trypanosomes and sometimes occurred in apparently healthy camels, while in other cases they were found in anaemic animals without evidence of trypanosomiasis. They varied in size, rarely exceeding a quarter of the diameter of a corpuscle, and might be round, pear-shaped or rod-shaped. Multiplication forms are described as occurring usually outside the corpuscles, and consisting of one or more parasites enclosed in a capsule. When numerous, the small chromatic granules might be scattered through the bodies or grouped round the circumference. It is suggested that such forms represent a stage of schizogony and thus resemble *Theileria.* On the other hand pear-shaped forms occurred in couples or sometimes in fours as a cross, so that it is possible that a mixed infection might have been involved. In one animal which had come from Libya, anaplasms were also detected.—U. F. R.

ROETTI, C. (1938). Le tripanosomiasi animale nel Galla e Sidama. **[Animal Trypanosomiasis in Galla and Sidama, Southern Abyssinia].**—*Arch. ital. Sci. med. colon.* **19.** 335–339.

Disease in equines due to *T. brucei* has been chiefly encountered in army mules, and it is thought that infection has been transmitted by tsetse flies on the Didessa, Berber, Acobo, Chibise, and Berberuaha rivers near the Sudan border, and on the Omo river. Three species of tsetse, *Glossina morsitans*, *G. pallidipes* and *G. palpalis* have been identified. Treatment of horses with arsenicals and antimonials has not been satisfactory.

In cattle, infection with *T. vivax* has been encountered at Gimma, but only isolated cases have occurred, although biting flies of the genera *Stomoxys*, *Tabanus* and *Haematopota*, which are thought to be vectors, are numerous in the area.—U. F. RICHARDSON.

—. (1937). **Trypanosomiasis of Cattle in the Nuba Mountains].**—*Rep. Dep. Agric. Sudan, 1936.* pp. 51–52. [See also *V. B.* **11.** 372].

An experiment was carried out on three working bulls in order to ascertain the extent to which they may be kept free from infection during the rains by precautionary measures only. The results were far from conclusive, although they indicated that, with constant care, much may be done to avoid serious losses from trypanosome infection and that such precautions are by no means vain.

—. (1938). **Trypanosomiasis of Cattle in the Nuba Mountains.**—*Rep. Dep. Agric. Sudan, 1937.* pp. 65–66.

A very brief note on a few observations on ten cattle.

—. (1939). **Trypanosomiasis at Morogoro and Kingolwira Experimental Stations, 1938.** —*Rep. gen. Exp. Fms, Tanganyika, 1938.* pp. 17–19. 2 tables.

The cattle at the Morogoro Station were much less healthy than in previous years in spite of the fact that no tsetse flies were observed in or around the cattle sheds or on the Station, and it was thought that a possible source of infection might be the flies brought by the large number of lorries which passed the farm.

A *Glossina* investigation was carried out at Kingolwira by LLOYD of the Tsetse Research Department, and he reported that *G. pallidipes* was more abundant and scattered than had been realized, but that the general fly situation had improved during the year.

PIGOURY, L., & BERNARD, M. (1938). La trypanosomose du dromadaire en Syrie. **[Trypanosomiasis in Dromedaries in Syria].**—*Rec. Méd. vét. exot.* **11.** 57–71. [8 refs.]

It is thought that camel surra occurs throughout the Syrian steppes, but although bedouin

animals are sometimes affected, the principal sufferers are the army animals, of which about 5% are infected. During the first four months of infection no clinical symptoms appear, but during the next 3–6 months intermittent fever, irregular appetite, and attacks of diarrhoea are noticed, and this stage is followed by one of anaemia and emaciation.

For diagnosis the examination of fresh blood preparations is recommended, and if no microscope is available on the spot, blood can be collected in a bottle. The motility of the organisms is maintained in blood kept at 15°–20°C. for 36 hours. The trypanosomes are numerous in the blood during the periods of fever, but are usually also detectable during the afebrile periods. The complement-fixation test and the mercuric chloride test are also stated to be reliable, but no mention is made of the use of these tests.

Control measures recommended are examination of the herds in November and December, making three blood examinations during a week, and treatment of affected animals by the intravenous injection of 3 g. naganol combined with either 3 g. trypoxyl or 1 g. anthiomaline. The use of the arsenical or antimonial preparations is said to allow a reduction in the dose of naganol, and also to prevent relapses, which have not occurred in treated animals. [No information is given as to the number of animals treated.]

It is thought that although infection occurs in the summer it is advisable to postpone treatment until the autumn as this procedure allows the development of an active immunity. It is claimed that experiments on dogs showed that animals treated in the early stages developed no immunity, whilst those treated after 6–8 weeks were immune to reinfection for over a year.

—U. F. Richardson.

Biocca, E. (1938). Studi sull'infezione sperimentale di embrioni di pollo e di polli adulti con *Trypanosoma brucei*. [**Experimental Infection of Embryos and Adult Fowls with** *T. brucei*].—*Ann. Igiene (sper.).* **48.** 532–547. 10 figs. on 3 plates, 2 charts. [17 refs.]

B. was able to infect chick embryos with *T. brucei* by inoculating them with a few drops of the blood of infected g. pigs. Infection occurred only if inoculation was carried out between the 8th–14th days of incubation. Trypanosomes began to appear in the blood of the embryos three days after inoculation, and increased in numbers until the fifth or sixth day when the embryo died. The embryos of some strains of fowls were not susceptible to infection, notably Rhode Island Reds, in which breed successful infection was obtained in only one egg out of 18. Duck and pheasant embryos also proved resistant.

The trypanosomes could be passaged in series through chick embryos without any alteration in morphology or virulence. After death of the embryo trypanosome motility persisted for 12–24 hours in the incubator, and up to 15 days in the ice chest, but even in the latter case virulence was lost in less than two days. The only pathological evidence of infection was the presence of small foci of necrosis in the embryonic livers.

Adult fowls inoculated intramuscularly with the blood of infected g. pigs or of chick embryos, showed no evidence of disease, except for the suppression of egg laying, and trypanosomes could never be detected in their blood, but a g. pig inoculated with the blood of one fowl, seven days after the latter's inoculation with infected blood, contracted the infection and died.—U. F. Richardson.

Mannozzi-Torini, M. (1938). Una tecnica per la separazione dei tripanosomi dal sangue circolante e preparazione di emulsioni di tripanosomi. [**Method of Separation and Concentration of Trypanosomes from the Blood**].—*Boll. Ist. sieroter. Milano.* **17.** 824–829. 1 plate. [7 refs.] [German summary].

The author recommends that the blood should be diluted with an equal quantity of a mixture of nine parts normal saline and one part 4% sodium citrate. It is then centrifuged for 4 min. at 1,800 r.p.m. which throws down the erythrocytes and white corpuscles but leaves the trypanosomes in suspension. The liquid is pipetted off and centrifuged at 4,000–5,000 r.p.m. which throws down the trypanosomes. In some cases no blood cells will remain and all that is required is to wash the trypanosomes free from plasma by suspending the deposit in saline and again centrifuging. If blood corpuscles still occur in the sediment the process of slow centrifugation to remove corpuscles, followed by rapid centrifugation to sediment the trypanosomes, is repeated.

—U. F. Richardson.

Jerace, Felice. (1938). Sulla morfologia della *Castellanella brucei*. [**Morphology of**

Trypanosoma brucei]. — *Ann. Igiene (sper.)*. **48.** 555–559. 1 text-fig., 12 figs. on 2 plates. [4 refs.]

It is claimed that in g. pigs, rabbits, rats, and dogs infected with *T. brucei*, the blood parasites appeared in slender, broad, leishmanial, crithidial, leptomonal, and plasmodial forms. The slender forms appeared in the early stages of infection, and the broad forms after the trypanolytic crisis. The other forms are regarded as degenerative, and in several cases phagocytosis by histiocytes was noted. [The article is unconvincing, and, judging from the figures, many of the specimens were badly prepared.]—U. F. RICHARDSON.

I. BIOZZI, S. (1938). Azione della acque oligodinamiche e di alcuni preparati di metalli colloidali sulla infezione sperimentale da *Castellanella brucei*. [**Action of Oligodynamic Waters and of Certain Preparations of Colloidal Metals on Experimental** *Trypanosoma brucei* **Infections**].—*Riv. Parassit.* **2.** 95–110. 4 figs. on 1 plate. [7 refs.] [English summary].

II. BIOZZI, S. (1938). Contributo alla chemioterapia della tripanosomiasi sperimentale. [**Chemotherapy of Experimental Trypanosomiasis**].—*Boll. Ist. sieroter. Milano.* **17.** 175–182. 2 figs. on 1 plate. [4 refs.] [German summary].

I. G. pigs infected with *T. brucei* were treated by intravenous injections of distilled water which had been kept in contact with electrolytic copper, granular zinc, and silver, and also with two preparations of colloidal copper. In the case of the animals treated with the oligodynamic water preparations some prolongation of life appeared to be obtained, and in the case of one of the colloidal copper solutions (0·03 % solution of copper hydroxide) two out of three treated g. pigs appeared to make a complete recovery, their blood failing to infect other animals. The third g. pig, treated with this preparation, is thought to have died from pericarditis caused by the treatment which was given by intracardiac injection.

II. This article deals with the same work as I.—U. F. RICHARDSON.

MANNOZZI-TORINI, M. (1938). Studio di un fermenti proteolitico nel tripanosoma della surra (Evansi). [**A Proteolytic Ferment in** *Trypanosoma evansi*].—*Boll. Ist. sieroter. Milano.* **17.** 830–838. 5 tables, 8 graphs. [13 refs.] [English, French and German summaries].

It is claimed that proteolytic ferments were detected in a suspension of *T. evansi* which had been obtained in a pure state from the blood of infected g. pigs by fractional centrifugation and washing. Duplicate series of tubes were prepared containing trypanosome suspensions and various proteins, the pH being controlled by the addition of acetic acid + sodium acetate, phosphate solutions, or veronal. The nitrogenous fraction not precipitated by trichloracetic acid was determined in one tube at the time of preparation and in the duplicate after 24 hours' incubation, the increase being taken as indication of the activity of the enzyme. The optimum acidity was found to be pH 5·9. The enzyme digested casein and had some action on gelatin and blood serum. It was inactivated by heating to 70°C. for 20 min.—U. F. RICHARDSON.

CARPANO, M. (1938). Sulla morfologia dei tripanosomidi in rapporto all'ambiente. [**Morphology of Trypanosomes in Relation to Environment**].—*Riv. Parassit.* **2.** 81–90. 1 plate. [11 refs.] [English summary].

It is pointed out that the morphology of trypanosomes varies with the media in which they develop, and that forms encountered in the tissues or organs may differ considerably from individuals of the same species occurring in the blood. Thus *T. theileri* may appear in the blood as a large trypanosome with a distinct undulating membrane, or more rarely as a crithidial form. In the organs, such as the lymph nodes or brain, four forms may be detected :– trypanosome forms narrower than those of the blood with a straight undulating membrane, giving the appearance of a large spirillum ; crithidial forms ; plasmodial forms in which the division of the nucleus is not followed by the division of the cytoplasm ; and leishmanial forms. Some authors have suggested that these atypical parasites may represent a sexual development, others consider them resistant forms, while others ascribe them to degeneration, but probably they represent a reaction of the organism to a different environment, since they have been recorded in all species of trypanosomes in which penetration of organs has been detected.

Similar forms are now described for *T. equiperdum* from vaginal smears of mares affected with a mild form of dourine in Albania.

—U. F. RICHARDSON.

RUBINO, M. C. (1938). Coccidiosis de los terneros (Diarrea Roja). Primeras observaciones en el Uruguay—Estudio de la evolucion del parasito. [**Coccidiosis of Cattle in Uruguay**].—*Bol. mens. Direcc. Ganad. Montevideo.* **22.** 196–206. 4 figs. on 3 plates.

R. describes a haemorrhagic diarrhoea caused by coccidiosis in young cattle in Uruguay. The symptoms and lesions were quite typical of coccidiosis. He describes the oocysts as ovoid, pale yellow and measuring 18·5–40μ long by 14–28μ broad. They had no micropyle and developed four sporoblasts leaving no residual body, but on the development of two sporozoites a residual body remained.

R. is in doubt as to the identity of the *Eimeria* concerned, but suggests it is the same as that described by GUILLEBEAU (1893) and SMITH and GRAYBILL (1918).—M. WATSON.

DEEM, A. W., & THORP, F., Jr. (1940). **Coccidia and Coccidiosis in Feeder Lambs.**—*J. Amer. vet. med. Ass.* **96.** 783–785. 2 tables. [2 refs.]

Nearly 700 young lambs bought by the Colorado Experiment Station were divided into seven groups, each group receiving different rations. The faeces of lambs from each group were examined every three weeks for coccidia. The oocyst count reached its peak in one month, and then declined for the next three months, after which few or no oocysts were found [see also *V.B.* **9.** 696].

Eimeria parva predominated or was found alone in the peak counts. Later *E. arloingi* predominated in the same lambs; no cases of red dysentery were produced for which *E. parva* seemed to be responsible. The first cases of dysentery were observed 16 days after the lambs arrived at the research station. Scouring was severest in a group fed on beet tops and straw, but the incidence of coccidiosis in this group did not differ greatly from that in groups receiving alfalfa. A lower mortality was observed in groups fed sugar cane hay. The reason given for this dietetic influence is that cane hay is a less radical change from the grazing diet than alfalfa, beet tops, and straw, and consequently causes less digestive disturbance and predisposition to coccidiosis.

—A. L. WILSON.

TORRES, S. (1938). Eimeriose dos caprinos (Eimeria arloingi) em Pernambuco. [*E. arloingi* **Infection in Goats in Pernambuco**].—*Bol. vet. Exer. Brasil.* **5.** 97–100. 5 figs.

T. describes widespread coccidiosis in goats in the state of Pernambuco. The condition is often accompanied by trichostrongyle infestation, although in many cases P.M. examination has shown death to be due to uncomplicated coccidiosis. T. describes the coccidium and concludes that it is *E. arloingi*.

The high death rate in Pernambuco is due to the poor circumstances in which the goats are kept.—MILLER WATSON.

GASSNER, F. X. (1940). **Studies in Canine Coccidiosis.**—*J. Amer. vet. med. Ass.* **96.** 225–229. 2 figs., 1 table. [8 refs.]

An examination of faecal samples from 320 dogs in Colorado revealed that 79% were infected with species of *Isospora*. Benbrook's and Bourne's modifications of Sheather's sugar-flotation method were used throughout. An experimental group of 14 animals was closely observed. In these the organisms were generally voided in the sporocyst stage. Two doses each of 0·25 gr. arecoline hydrobromide were administered to eight of these dogs, in an attempt to break the chronic stage of the infection. In three cases oocysts then appeared in the faeces. All of the experimental animals were ultimately autopsied. A few which had received arecoline showed signs of acute coccidiosis, but in all others only a chronic subclinical type was present.—D. D. OGILVIE.

PATSOURI, E. (1938). Ueber einige experimentelle Erfahrungen bei der Kaninchencoccidiosis. [**Some Experiments with Rabbits Affected with Coccidiosis**].—*Z. ges. exp. Med.* **103.** 222–225. [10 refs.]

In the course of experimental work on the vital staining of the reticulo-endothelial system of male rabbits 4–5 months old and of 1,200 g. body weight, it was found that when 40 c.c. of lithium carmine was injected intravenously in seven doses at hourly intervals, convulsions and deaths occurred in many animals after the second or third injection. These proved to be rabbits uninfected with coccidia. Five rabbits infected with *Eimeria stiedae*, but not showing obvious symptoms of disease, were treated in the same way and were found to tolerate the stain quite normally. The lesions produced in the liver by coccidia are separated from the surrounding tissue by capsules of connective tissue and in this newly formed tissue masses of lithium carmine granules were to be seen.

It was concluded that coccidia-infected rabbits are tolerant to the stain because it is stored in these young connective tissue cells, as well as in the cells of the reticulo-endothelium of the liver and spleen, and therefore a lesser quantity of it is available for circulation in the blood.

It was also shown that coccidiosis lessens the natural resistance of rabbits to cold, and for these reasons rabbits which are infected with coccidia do not make good material for experimental purposes.—C. HORTON SMITH.

MAYNE, B. (1938). **Graphic Reproduction of the Life Cycle of the Malaria Parasite in the Mosquito Host.**—*Nat. Inst. Hlth Bull.* No. 170. pp. 15. 1 fig., 25 plates.

An account is given of the development of malarial parasites in mosquitoes. It is pointed out that the critical period is the penetration of the gut wall by the zygote: whilst syngamy may occur in the gut of many invertebrate hosts, penetration of the wall occurs only in an individual of a carrier species. The appearance of the oocysts is described at various stages, 1–3 days, 4 days, 6 days, 7 days, and over 7 days. A very fine series of photomicrographs gives an exceptionally clear picture of the stages of development described.—U. F. RICHARDSON.

SHORTT, H. E., MENON, K. P., & IYER, P. V. S. (1940). **The Form of *Plasmodium gallinaceum* Present in the Incubation Period of the Infection.**—*Indian J. med. Res.* **28.** 273–276. [7 refs.]

Massive doses of sporozoites, obtained from *Aëdes aegypti* or *A. vittatus* infected with *P. gallinaceum* 10–12 days previously, were inoculated in one case into the chorio-allantoic membrane of a chick embryo, and into two three-week-old chicks. A massive infection with exo-erythrocytic forms was found in the brain, liver, spleen, and bone-marrow, and a moderate infection of the heart blood with erythrocytic pigmented parasites was noted at the time of hatching of the chick 11 days later, and 7 days later in the case of one of the older chicks. But the third chick, killed six days after inoculation, showed few exo-erythrocytic forms and these were in the brain only; no erythrocytic parasites were found in the heart blood. Thus, the exo-erythrocytic forms appear to be the "incubation period" forms of the parasite, which arise directly from sporozoites.

The authors conclude that the sporozoites are filtered out of the circulation by reticulo-endothelial cells, where they become schizonts, which in turn produce merozoites to enter new cells and repeat the process. Some merozoites produce erythrocytic pigmented parasites, but the exo-erythrocytic cycle continues indefinitely and may become a low-grade infection, capable of producing gametocytes which may lead to relapses long after the exo-erythrocytic cycle is completed.—M. L. BINGHAM.

SPENCER, R. (1940). **Anaplasmosis-Like Disease of Swine.**—*Vet. Med.* **35.** 294–295. [7 refs.]

Notes are given of two outbreaks which occurred in the summer of 1930, of an acute disease of young pigs, consisting of an ictero-anaemia with hepatic degeneration and splenic enlargement, probably caused by *Anaplasma* or *Rickettsia* bodies found in the erythrocytes. In both herds the condition appeared to be precipitated by serum-virus vaccination against swine fever. The P.M. findings agree with those previously described by other workers [*V. B.* **5.** 127]. The mortality in each case was 7–8%.—ALASTAIR N. WORDEN.

DISEASES CAUSED BY VIRUSES

I. JANSSEN, L. W. (1938). **The Virus of the Foot-and-Mouth Disease. A Nucleo-protein.**—*Versl. werkzaam. Staatsveearts. Onderzoek.-Inst. 1936–37.* pp. 62–66. [11 refs.] [In English].

II. JANSSEN, L. W. (1938). Het mond- en klauwzeervraagstuk bekeken van de chemische zijde. **[Foot and Mouth Disease Virus from the Chemical Aspect].** —*Ibid.* pp. 67–86. [Numerous refs.]

I. The virus of F. & M. disease was purified by J. in 1937 by saturating diluted vesicle lymph with gypsum and adding a small quantity of alcohol and ether. The $CaSO_4$ so precipitated carried down the virus, leaving other proteins in solution. On centrifuging and redissolving the precipitate the adsorbed virus passed into solution, leaving a small quantity of insoluble protein behind. Repetition of this process gave a clear solution of pure virus with the whole original activity of the lymph.

The product could also be purified by repeated precipitation with ammonium sulphate at pH 7·6 without change of properties; it

then showed all the characters of a homogeneous protein, although it could not be crystallized by the method used by STANLEY for tobacco-mosaic virus. The quantity of virus so obtained corresponded to 1–2 mg. per c.c. of lymph, and taking the average titre of lymph as 10^6, a titre of 10^9 is obtained for the virus protein on a weight basis.

The present observations confirm the earlier demonstration of phosphorus in the virus protein in quantities of the order of 0·5%. A nucleic acid could be split off by heat denaturation and this contained a sugar regarded as *d*-ribose. The Dische and Feulgen reactions were negative, indicating freedom from thyminose, the typical sugar of nuclear nucleo-protein, and suggesting that the virus protein was a nucleo-protein of the type found in cytoplasm. J. maintains that a chemically purified protein of molecular weight about 4 million, containing only 150 molecules of nucleic acid, showing no metabolism, and conservable in alcohol, ether, and KCN, cannot be regarded as a "living thing", and must be considered not as multiplying itself but as being synthesized by the affected epithelial cells of the animal. He considers that viruses are abnormal cytoplasmic nucleo-proteins which exert toxic effects on the synthesizing nuclear organization, which then produces more of the abnormal type of protein; and that virus diseases should therefore be regarded as "infectious metabolic disturbances".

II. This article is a speculative review best read in the original. It comprises a general introduction followed by sections on comparison of F. & M. disease virus with other viruses, critical analyses of experiments on the virus up to 1938, later study of the virus by chemical and physical agents, its isolation in pure form, its chemical composition as a ribose nucleo-protein, and the relationship between the virus and the disease. The view expressed in I, that the virus does not "multiply itself" but is "multiplied by" the specific cells in which it is found, is amplified.—H. H. GREEN.

RUBINO, M. C., & TORTORELLA, A. (1940). Lucha biologica contra la fiebre aftosa. Ensayos de aftizacion con virus modificados. **[Vaccination against Foot and Mouth Disease]**.—*Bol. mens. Direcc. Ganad., Montevideo.* **24.** 108–146.

The authors describe the methods used and the results obtained in vaccination against F. & M. disease.

Virus was attenuated by passage through numerous g. pigs. While still attenuated it was passed once only through sheep (to prevent retrogression to the unattenuated form) to obtain serum in large quantities. This procedure avoids the possibility of contamination with any other organism pathogenic to cattle which always occurs if the virus is passed through cattle to obtain larger quantities.

The vaccine was injected subcutaneously in two or more doses of from 0·5–5 c.c. in cattle probably exposed to infection. The animals were mostly on premises where F. & M. disease was already present, or was present on a neighbouring property. The vaccine produced a very mild reaction or no visible reaction and in no case did it produce an outbreak of the disease where no outbreak had existed before vaccination.

8,500 animals in 27 properties were vaccinated. In two properties there was no opportunity to judge of results as the disease did not appear in the district. In five properties the results were doubtful as the natural disease was present. In 20 properties the vaccine seems to have provided a useful degree of immunity. Further trials are being carried out.

—MILLER WATSON.

I. MORNET. (1939). Essais d'immunisation contre la péripneumonie par la sérosité enrobée en excipient gras. **[Immunization against Bovine Contagious Pleuro-Pneumonia by Exudate in a Fatty Base]**.—*Bull. Serv. zootech. Epiz. A.O.F.* **2.** No. 3. 12–13.

II & III. PHILIPPE, J., & SISSOKO, M. (1939-40). Essai d'immunisation contre la péripneumonie. **[Immunization against Bovine Contagious Pleuro-Pneumonia. I & II]**.—*Ibid.* 8–11 and **3.** No. 1. 7–10.

IV. GARGADENNEC, & MARTIGNOLES. (1940). Essais d'immunisation anti-péripneumonique par injection de sérosité virulente enrobée en excipient gras. **[Attempted Immunization against Bovine Contagious Pleuro-Pneumonia by Injection of Virulent Serous Fluid in an Oily Excipient]**.—*Ibid.* **3.** No. 1. 11–13. 1 table.

I. M. used lung exudate in lanolin and liquid paraffin; it was fully virulent and useless as a vaccine.

II. The authors give the results of vaccina-

tion trials with lung exudate in an oily excipient (lanolin plus liquid paraffin, vaseline or groundnut oil). In all cases the material remained fully virulent and was useless for vaccination purposes.

III. The authors studied the effect of a longer contact of the virus with the oily excipient at a higher temperature than in I, but the immunity conferred by this vaccine was insufficient, although the vaccine was harmless. They also tested a mixture of exudate plus 2% saponin and exudate plus 3% alum. The results showed that the virus-saponin mixture was infective in some cases and harmless in others, but was without vaccinating power, whilst a virus-alum mixture was infective in half of the tests.

IV. A fresh mixture of exudate and lanolin and vaseline proved to be fully virulent when injected subcutaneously into calves. [See also *V. B.* **10.** 572].—L. T.

FARACO, J. (1938). Nova technica para a obtenção de esfregaços "por compressão e distensão" de partes do encephalo, medula espinal, etc. para a pesquisa de corpusculos de Negri. Coloração rapida dos esfregaços pelo methodo de Mann. **[New Technique for Obtaining Material "by Compression and Distension" of Parts of the Brain, Medulla, etc., for finding Negri Bodies. Rapid Staining of Material by Mann's Method].**—*Rev. Biol. Hyg., S. Paulo.* **9.** 90–96. [3 refs.] [English summary].

F. describes his technique for the preparation of material from the central nervous system (namely, the cerebral cortex, hippocampus, cerebellum, and medulla oblongata) for the detection of Negri bodies. In the case of fresh tissue the subsequent procedure is as follows :– a small piece is placed in 20% formol and multiple small cuts are made to facilitate penetration of the fixative. After 2–3 min. it is transferred for another 2–3 min. to 10% ammonia, when it becomes soft and viscous. A moistened strip of filter paper is placed at one end of a slide and the tissue is placed on it to remove superfluous fluid. It is then moved on to the slide and the smear made as follows :– Another slide is pressed on the tissue and held at a very acute angle and drawn along the slide in a zig-zag manner using a fair amount of pressure. The slide is immersed in the final fixative with the smear side downwards, and finally dehydrated, cleared and mounted. If the material is to be kept before staining it is set in paraffin.

Details are given for the treatment of material preserved in glycerin or other media. The staining method used is described.—M. W.

LEACH, C. N., & JOHNSON, H. N. (1940). **Canine Rabies Vaccination. An Experimental Study of the Efficacy of the Single Subcutaneous Injection Method with Phenol Treated Vaccine.**—*Amer. J. Hyg.* Sect. B. **32.** 46–53. 3 tables. [17 refs.] [Authors' summary copied *verbatim*].

One hundred and five dogs vaccinated by the single-injection method were tested in parallel with 120 controls. The vaccine employed was a phenol-treated product of one commercial laboratory and was purchased in the open market. It was given subcutaneously in a single, 5–c.c. dose. The dogs tested were of known age and breed and had not been previously vaccinated. The test virus was brain material obtained from dogs dying of furious rabies and was inoculated intramuscularly.

Natural resistance of unvaccinated dogs to artificial intramuscular inoculation with massive doses of street virus is demonstrated. Of 105 vaccinated dogs, 24·8 per cent died of rabies after test virus inoculation, while 55 per cent of 120 control animals succumbed to the disease. The mortality among control animals was significantly higher than that observed among vaccinated dogs.

It is concluded from this study that a single subcutaneous vaccination with phenol-treated vaccine affords some protection against subsequent experimental exposure to rabies street virus.

WEBSTER, L. T. (1940). **A Mouse Test for Measuring the Immunizing Potency of Antirabies Vaccines.**—*J. Amer. vet. med. Ass.* **96.** 65–73. 10 tables, 1 chart. [2 refs.]

W. discusses the difficulties of testing vaccines and states that no quantitative or standardized method has yet been developed. Test injections of vaccinated animals, given intracerebrally, yield negative results. A mouse test which seems to be practicable, was used to test some commercial vaccines. The given vaccine is diluted tenfold and injected into 16 three-week-old Swiss mice, 16 others being used as controls, and five two-week-old mice being used for the virulence test. Three weeks

later, two, four, eight and 16 doses of standardized virulent virus are given intramuscularly. Taken together, the experiments show that no vaccine given subcutaneously, and no phenolized vaccine given either subcutaneously or intraperitoneally, immunized against more than two intramuscular doses of test virus. Chloroformized vaccines immunized against 4–10 doses when given intraperitoneally in amounts 5–10 times those advocated for dogs per g. body weight, and occasionally when given in amounts corresponding to the dog dose. In order to check these results, similar work has been done on dogs, a natural route for injecting the virus being, as far as possible, always used. The results to date parallel the results of the mouse tests. It is submitted that the mouse test is reliable. It has shown phenolized single injection canine vaccines to be weak in immunizing potency.—R. FISHER.

—. (1940). **The Causes of Influenza.**—*Brit. med. J.* April 27th. 694–695. [5 refs.]

The isolation of a ferret pathogenic virus (influenza virus A) from cases of human influenza led to the hope that an effective method of artificial immunization could be devised. Recent investigations by TAYLOR [(1940). *Amer. J. Hyg.* **31.** 36.] have shown, however, that there are well-defined, antigenic differences between influenza A strains isolated in Hungary and classical viruses studied in England and America; moreover, a vaccine prepared against the English WS strain seemed to be ineffective in controlling the disease.

A second complication arises from the suggestion of STUART HARRIS, WILSON SMITH & ANDREWES [(1938). *Spec. Rep. Ser. med. Res. Coun. Lond.*, No. 228.] that the failure to demonstrate virus in cases of apparent influenza, which hitherto have been taken as an indication that the diagnosis was incorrect, may be explained on other grounds. During the 1939 and 1940 epidemics material from cases having clinical features of virus influenza failed to infect ferrets and the conclusion cannot be escaped that true influenza can be caused by some agent other than a ferret-pathogenic virus.

A plea is made for a more complete study of micro-organisms in the upper respiratory tract which may have escaped detection, and for a consideration of the prevention of influenza by methods other than those of artificial immunization. The possibility of reducing bacterial contamination of the air by chemical means is especially stressed.

[Since this editorial was written FRANCIS (1940. *Science.* **92.** 405.) has reported the isolation of a second virus from human influenza which is termed influenza virus B. It is quite distinct immunologically from virus A.]

—R. E. GLOVER.

HORSFALL, F. L., Jr., & LENNETTE, E. H. (1940). **The Synergism of Human Influenza and Canine Distemper Viruses in Ferrets.**—*J. exp. Med.* **72.** 247–259. 8 graphs. [17 refs.]

In a previous paper [HORSFALL, F. L., & LENNETTE, E. H. (1940). *Science.* **91.** 492.], it was shown that a formalinized complex vaccine from the spleen of ferrets, injected concurrently with the viruses of influenza A and of distemper, was highly effective in producing an immunity against human influenza.

In this paper it is shown that there is no apparent relationship between the two viruses, since ferrets immunized against influenza A were fully susceptible to distemper and *vice versa.* Nevertheless, the concurrent infection of ferrets with both viruses modified the course of the influenza infection, since active virus persisted in the lungs of doubly infected ferrets up to the 12th day, whereas in ferrets infected with influenza only, the virus had disappeared by the 7th day. It is considered probable that the generalized infection with distemper virus arrested the development of influenzal antibodies. It is postulated that the effectiveness of complex vaccines prepared from doubly infected tissues is related to an antigenic modification of influenza virus brought about by its persistence in the lungs.

The phenomenon was not encountered with all strains of distemper virus: in particular, one strain termed "X" was strikingly effective. Experiments in other animals, *e.g.*, g. pigs, rabbits, mice, etc., excluded the possibility of contamination with a different virus such as that of lymphocytic chorio-meningitis.

—R. E. GLOVER.

I. BUENO, P. (1939). Etiologia da pneumonia contagiosa dos suinos. **[Aetiology of Contagious Pneumonia of Pigs].**—*Arq. Inst. biol., S. Paulo.* **10.** 279–289. [10 refs.] [English summary].

II. BUENO, P. (1939). Alteraçoes histologicas do pulmão em face do virus da pneumonia contagiosa dos suinos. **[Histological Changes in the Lungs Caused by the Virus of Contagious Pneumonia of**

Pigs].—*Ibid.* 291–300. 1 text-fig., 11 figs. on 5 plates. [Numerous refs.] [English summary].

I. B. reports investigations into the aetiology of a disease which he designated bronchopneumonia of swine in an earlier paper [*V. B.* **10.** 947].

From material from naturally infected pigs he isolated *Salmonella*, *Pasteurella*, *Bacterium coli*, staphylococci, and a *Haemophilus*. Intranasal injections of suspensions of these organisms into piglets did not reproduce the disease. Filtrates of lung material from animals which had succumbed to the disease were also given to piglets. These were destroyed after 12–15 days. In every case there were microscopic lung and other lesions typical of swine influenza as described by SHOPE, but there was little visible alteration from normal.

A number of pigs were infected with virus and bacterial suspensions, and these combinations produced typical pneumonia lesions, notably when *Salmonella* was associated with virus. Virus plus *Haemophilus* caused only a monocytosis in the affected tissue.

B. concludes that the disease is caused by a virus in association with bacteria. The virus alone causes a benign condition. It is emphasized that *Haemophilus* was not always found in the virus plus bacteria infection, and that when it was found it was always associated with other bacteria.

As the disease affects piglets almost exclusively, B. concludes that it is identical with the disease described by KÖBE as *Ferkelgrippe*.

II. B. describes the lung lesions found in contagious pneumonia of piglets, both when infection is due to the virus alone and when the virus is associated with bacteria.

In the simple virus infection the macroscopic lesions are slight. There is some collapse and the lung is brownish red in colour. Bronchial and mediastinal lymph nodes are inflamed and enlarged. Microscopic examination reveals intense inflammatory changes. In animals infected a few days before being destroyed and autopsied there is considerable multiplication of histiocytes in the alveoli which are much thickened. In more advanced cases cellular multiplication is increased and there are collapsed areas. Later there is an intense peribronchiolar invasion by lymphocytes and in some cases the lymphocytic invasion extends to tissues surrounding arterioles. It is notable that considerable numbers of eosinophile leucocytes are found among the lymphocytes. In very advanced cases there is some exudate in the bronchioles accompanied by desquamated epithelium and a few lymphocytes. The regional lymph nodes show hyperplasia of the reticulo-endothelial cells and cortical hyperaemia.

In infections by virus associated with bacteria the lesions seen macroscopically are confined mainly to the apical and cardiac lobes and are those of catarrhal or purulent pneumonia with consolidated areas in chronic cases. Microscopically, there is desquamation of the bronchial epithelium with ulceration and even rupture in some cases. There is oedema of the submucosa with polymorph infiltration. The peribronchial tissues show many lymphocytes and eosinophiles. In the alveoli there is thickening and desquamation of epithelium with fatty degeneration. The exudate has many neutrophiles, eosinophiles and sometimes monocytes. Miliary abscesses are found and there is serous or fibrinous exudation. In chronic cases there is considerable fibrosis. It is notable that when the disease is caused by virus associated with *Haemophilus* the exudates contain many monocytes.—MILLER WATSON.

I. LAWRENCE, J. S., & SYVERTON, J. T. (1938). **Spontaneous Agranulocytosis in the Cat.**—*Proc. Soc. exp. Biol., N.Y.* **38.** 914–918. 3 charts.

II. LAWRENCE, J. S., SYVERTON, J. T., SHAW, J. S., Jr., & SMITH, F. P. (1940). **Infectious Feline Agranulocytosis.**—*Amer. J. Path.* **16.** 333–354. 18 figs. on 5 plates, 1 table, 5 charts. [15 refs.]

I. A transmissible febrile disease, characterized by a marked leucopenia and apparently due to a filtrable virus, was found to be present in one of a group of laboratory cats which were being subjected to routine blood examination. The animal had a total leucocyte count of only 350 per c.mm., and a complete absence of neutrophiles in the peripheral blood. The condition was successfully transmitted to two out of five cats by inoculation of the supernatant fluid which resulted when a portion of the liver of the original animal was ground up with alumina in Locke's solution; subsequently 13 serial transmissions were accomplished by the same technique. Material from both the liver and the upper respiratory tract of an animal infected by the tenth passage was passed through a Berkefeld V filter, and in each case was found to be both bacteria-free and infective

for all six of the animals into which it was inoculated.

The average incubation period was five days, and was succeeded by inappetence, slight pyrexia (up to 106°F. in some cases) and listlessness. There was a sharp fall in the peripheral white blood cell count 6–8 days after infection. Just prior to this, and also in the recovery period, "stab" cells were found to be present in large numbers. The critical period of the disease lasted two days, ending either in death or in a resumption of appetite and recovery. The time taken for the blood picture to return to normal showed considerable variation.

II. This paper deals mainly with the haematological features of the disease, and is based on a study of 118 infected animals. The clinical features have been described previously [see I] and the other pathological observations made are in general agreement with those of HAMMON and ENDERS [*V. B.* **9.** 625]. The mortality rate in the present series was 66%.

A few days after exposure to infection, the total white blood cell count fell, either gradually or precipitously, and at the height of the disease the average count for the 118 cats was 1,850 per c.mm. [The normal value for cat's blood obtained in the laboratory is 15,000 per c.mm.] Differential counts showed a marked diminution in the number of neutrophiles; there was a relative lymphocytosis, and an increase in the number of "stab" forms (indicating a "shift to the left"), but the other white elements were not significantly affected. Apart from a slight anaemia, there were few significant changes in the red cell picture. Sections of spleens and lymph nodes showed a reticulo-endothelial hyperplasia.

Studies were made of bone marrow obtained, by biopsy or autopsy, at different stages of the infection: differential counts indicated that some of the myeloid elements were markedly decreased at the height of the disease, whereas percentages of erythroid cells remained almost normal.

Sections were prepared from different levels of the gastro-intestinal tracts of ten animals, and the authors were able to demonstrate the presence, in all regions except the oesophagus, of type A (Cowdry) intranuclear inclusion bodies in the epithelial cells of the mucosa.

The points of similarity between this disease and human agranulocytosis (which, it is stated, is probably not due to a filtrable virus) are discussed. The only virus disease known to have a similar blood picture to this feline infection is said to be swine fever.—A. N. W.

KRANEVELD, F. C., & NASOETION, A. (1939). Variabiliteit van hoenderpestvirus. **[Variability of Fowl Plague Virus].**—*Ned.-ind. Bl. Diergeneesk.* **51.** 104–114. 6 tables. [9 refs.] [English and German summaries. English summary copied *verbatim*].

The virus of fowlpest (strain Brescia) proved to be transmissible from mouse to mouse with absolute certainty by intracerebral injection. After such an infection the virus spread out through the entire body.

In the course of 100 intracerebral passages through mice—covering over a year—the virulence for mice was increased and the virus was so modified that it was also possible to infect mice by subcutaneous injection, which was not possible with the original strain nor with virus that in the course of the experiments had been passed exclusively through chickens. This modification took place rather quickly. The modified virus could also be changed back in the reverse direction. By passing the hundredth mouse-passage strain through chickens, it was found that after 60 passages it was no longer possible to infect mice by subcutaneous injection, while when this chicken-passage virus was injected intracerebrally into mice the time it took for them to die had again become longer and had again begun to show wider differences per group, as had also been observed with the original strain.

The pathogenicity for chickens was reduced somewhat by intracerebral passages through mice, but not greatly. When the hundredth mouse-passage strain was again passed through chickens, it rapidly regained its original virulence for the latter (after 15 passages).

MACFARLANE, M. G., & DOLBY, D. E. (1940). **The Enzymic Activity of Vaccinial Elementary Bodies.**—*Brit. J. exp. Path.* **21.** 219–227. 7 tables. [19 refs.]

This paper reports an exhaustive investigation for possible enzyme activities of vaccinia virus.

No dehydrogenase activity could be found even after the addition of suitable coenzymes, which would have been removed in the course of preparation of the virus. Tests for zymohexase, enolase, carbohydrases, and peptidase were also negative.

The virus preparation showed phosphomonoesterase, phosphodiesterase and polynucleotidase activity. The plant viruses, bushy stunt and tobacco mosaic, were also found to possess phosphatase activity.

The phosphatase activity of *Staphylococcus aureus* suspensions was so low that it was incapable of accounting for the activity of the virus suspensions which were slightly contaminated with this organism.

The significance of the data is discussed in relation to the pathological effects and the problem of the formation of the virus.

—R. A. KEKWICK.

LEA, D. E. (1940). **Determination of the Sizes of Viruses and Genes by Radiation Methods.**—*Nature, Lond.* **146.** 137–138. 4 tables. [13 refs.]

The inactivation of viruses and phages by exposure to ionizing radiations is a process of single unit nature. It is possible to estimate the size of virus particles from a knowledge of the inactivation dose.

Data obtained using radiations of differing wavelength give values for the diameter of phage 16 and of tobacco necrosis virus which are in good agreement with estimates obtained from ultracentrifuge measurements and ultrafiltration experiments.

From data on the production of sex-linked recessive lethal mutations in *Drosophila* by irradiation of sperm, it is possible to estimate approximately the number of genes in the X-chromosome.

The interpretation of the lethal effect of radiations on bacteria is considered.—R. A. K.

SCHRAMM, G. (1939). Zur Grösse des Virus der infektiösen Myxomatosis. **[Particle Size of the Virus of Infectious Myxoma].** —*Naturwissenschaften.* **27.** 149.

By repeated precipitation with ammonium sulphate from highly active virus solutions of infectious myxoma of the rabbit, S. succeeded in obtaining a purified protein fraction of which 7×10^{-6} g. still produced a pronounced tumour. From this dose a maximal " molecular weight " of 420 million was estimated. This is much lower than the 2,300 million estimated for the " elementary bodies " present in affected tissue and separated by RIVERS and WARD, and by VAN ROOYEN, by centrifugal methods.

[The term " molecular weight " is placed in inverted commas to indicate that " particle weight " would be equally appropriate. It means the number of times the protein molecule or biological particle is heavier than an atom of hydrogen. Even the smallest virus, however, is an aggregate of a large number of protein units organized into a biological unit. For a bird's eye view of the size and nature of the viruses, see the paper by GREEN, below.]

—H. H. GREEN.

GREEN, R. G. (1940). **The Biology of Animal Viruses.**—*Chemistry and Medicine.* pp. 157–184. 3 figs. Minneapolis : University of Minnesota Press.

This stimulating essay presents an attractively coherent view of the nature of viruses which only the original can convey.

After pointing out that none of the recent concepts of viruses as chemical units preclude their treatment in accordance with a biological system, G. deals in succession with concepts of disease, relationship of pathogenic microbes to free-living species, similarity of microbic and virus diseases, description of viruses, theories about the nature of viruses as adaptive forms from the microbic world, a biological concept of virus infections, and life histories of filtrable viruses. This last point is illustrated by comparatively detailed discussions of distemper virus, its changes under conditions of purposeful modification by passage, and changes of its virulence in nature.

Of greatest interest is the picture of the nature and position of viruses in the living world, derived from considerations of morphological and functional adaptive changes associated with parasitism of larger forms, *e.g.* parasitic adaptations of the tapeworm. The concept of adaptive change applied to pathogenic bacteria and protozoa leads to the view that viruses are " incomplete microbes ", biological units the behaviour of which may be interpreted as that of a simplified parasitic species maintaining itself. The processes of anatomical regression may continue not only to reductions of size beyond the ordinary range of the microscope, but even down to dimensions comparable with those of the larger protein molecules, and then show some of the characteristics more commonly associated with the idea of " chemical units ". Rickettsiae are regarded as forms intermediate between microbes and viruses and persist as a singular group because they are anchored by divergent complexities in two unrelated hosts. For forms beyond the range of microscopic vision there is the pleasing simile—" like the Cheshire cat

in Alice in Wonderland which faded away and left its grin, certain pathogenic microbes seemed to have faded from view and left their diseases to puzzle us".—H. H. GREEN.

HOFFSTADT, Rachel, & PILCHER, K. S. (1939). **A Further Study of the Virus of Infectious Myxoma on the Chorioallantoic Membrane of the Developing Chick Embryo.**—*J. infect. Dis.* **64.** 208–216. 6 tables. [10 refs.] [Authors' conclusions copied *verbatim*].

The optimum temperatures for the growth of virus of infectious myxoma of rabbits is 33–35°C. on the chorioallantoic membrane. The virus after repeated serial passage becomes adapted to the embryo as a medium for growth. After the virus has become adapted to the chick membrane, the titer of the chick virus is not affected by chilling the embryo. The virus grown on the chorioallantoic membrane produces an infection in the embryo as indicated by gross changes and blood count and by the fact that vitality of embryos inoculated with the chick passed virus is greatly reduced as indicated by the reduction of the percentage of hatch. Normal rabbit serum as a preservative of the virus of infectious myxoma is definitely superior to 50% glycerol and physiological salt solution.

BRYAN, W. R., & BEARD, J. W. (1939). **Estimation of Purified Papilloma Virus Protein by Infectivity Measurements.**—*J. infect. Dis.* **65.** 306–321. 5 figs., 9 tables, 1 chart. [11 refs.]

Description is given of a procedure for turbidity measurements of the purified papilloma virus protein and of the correlation of the results with protein determined by the micro-Kjeldahl method, giving a standard for quantitative protein estimation. The papilloma virus protein after purification by ultracentrifugation was determined quantitatively by turbidity measurements and by titration in rabbits. Attempts to interpret the findings on the basis of statistical studies of end titre and the 50% end point [see *V. B.* **9.** 315.] showed that for this particular protein the results obtained by these procedures were highly variable and unsuitable for quantitative work unless inordinately large numbers of rabbits were employed. A more accurate method for the measurement of infectivity was obtained by statistical study of the relation of the protein inoculated and the incubation period of induced lesions; a high correlation existed between decreasing amounts of protein and the appearance of lesions after a proportionately long incubation period, extending over the whole range of quantities of protein studied. This latter method was a comparatively accurate one for the estimation of the papilloma virus protein purified by ultracentrifugation. Parallel titration of identical inocula in the same group of animals gave results of small variation. This wide range of usefulness eliminates preliminary search for the narrow regions of dilution where the 50% end point and end titre can be expected.—A. E.

BEARD, J. W., BRYAN, W. R., & WYCKOFF, R. W. G. (1939). **The Isolation of the Rabbit Papilloma Virus Protein.**—*J. infect. Dis.* **65.** 43–52. 2 figs., 2 tables, 3 charts. [8 refs.] [Authors' summary copied *verbatim*].

A protein free of carbohydrate detectable by the Molisch test has been isolated by differential ultracentrifugation from extracts of infectious cottontail rabbit warts. It sediments with the sharp boundary characteristics of an undamaged molecular species and has a principal sedimentation constant s_{20} = ca 250×10^{-13} cm. sec^{-1} dynes^{-1}.

The yield of this protein was proportional to the virus activity of the extracts from which it was derived, varying from 1·0 mg. per gm. of very infectious warts to 0·008 mg. per gm. from warts of low infectivity. No protein has been obtained from non-infectious domestic rabbit warts. The infectivity associated with the heavy protein was constant and was not related to the infectivity of the source extracts. Papillomas were consistently induced by the inoculation of 10^{-9} gm. of protein.

Changes in the protein were accompanied by changes in virus activity. Infectivity was destroyed when the protein was coagulated at 65° to 66°C. or broken down by the action of acid or alkali. Virus infectivity was removed from solution by precipitation of the protein at its isoelectric point and was associated with the precipitate under these conditions.

ROSENBUSCH, C. T., & LUCAS, A. M. (1939). **Studies on the Pathogenicity and Cytological Reactions of the Submaxillary Gland Virus of the Guinea Pig.**—*Amer. J. Path.* **15.** 303–338. 28 figs. on 2 plates, 5 tables. [Numerous refs.] [Abst. from authors' summary].

A submaxillary gland virus of g. pigs was found which proved to be more virulent than that previously reported in the literature in that

it produced death regardless of the region in which the inoculation was made, whereas the submaxillary gland virus of g. pigs usually kills only after intracerebral inoculation.

Young, virus-free g. pigs taken from the colony that supplied the virus were slightly more resistant to the action of the virus than g. pigs of the same age taken from a colony in which all the animals were free from the virus. There is some evidence that the young g. pigs are more resistant to the action of the virus than full grown animals of the same stock.

The symptoms and histopathology of the disease follow the same course as that described by other workers for this virus. Giant cells of both the epithelioid and foreign body types have been found in all tissues of the body where inclusion-bearing monocytes may be seen.

Details are given of studies made on the cell inclusions and on the reactions in affected cells.

PEARCE, J. M. (1940). **A Comparison of Acquired Immunity and Species Resistance Based on the Cultivation of Virus III in Vitro.**—*J. Immunol.* **38.** 9–23. 2 figs., 4 tables. [17 refs.] [Author's summary copied *verbatim*].

Virus III can be cultivated *in vitro* indefinitely by serial transfer in simple, minced-rabbit-testis tissue-cultures. The rate of multiplication of the virus rapidly reaches a maximum at which it remains constant. The virus also survives and multiplies readily in rabbit testis tissue-cultures made from the testes of rabbits immunized by previous infection, provided normal, non-immune rabbit serum is used in the preparation, as well as in normal rabbit testis cultures containing the sera of animals of species naturally resistant to the infection. On the other hand, virus III does not survive in tissue-cultures containing the serum of a rabbit immunized by previous infection, nor does it survive in cultures made from the testes of animals of species naturally resistant to the virus, irrespective of the type of serum used.

From these observations on the behavior of virus III cultivated *in vitro*, it may be concluded in respect to infection by this virus that acquired immunity is humoral in character and depends on the presence of neutralizing antibody. Species immunity, or natural resistance, on the other hand, is cellular in character, and is not related to the presence of an inactivating substance in the blood.

HOLWECK, F., LURIA, S., & WOLLMAN, E. (1940). Recherches sur la mode d'action des radiations sur les bacteriophages. **[The Effect of Irradiation on Bacteriophage].**—*C. R. Acad. Sci., Paris.* **210.** 639–642. 1 graph. [6 refs.]

Studies were made on the effect of irradiation on bacteriophage C_{H6}, active on the dysentery bacillus Y_{6R}. The radiations employed were X-rays of two different wave-lengths and α-rays (from radon disintegration), and the effect of the action was measured by comparing the numbers of colonies growing on agar-agar media with suitable unheated control growths. The principal results were (1) the number of active particles of bacteriophage decreased exponentially as a function of the degree of irradiation; (2) the action of the irradiation was proportional to the product of the intensity of the radiation and the length of time of exposure; (3) this action, for X-radiations, was independent of the wave-length employed, and (4) X-rays were seven times as effective as α-radiations expressed in comparable units of intensity (ions per c.c.). From mathematical considerations of the theoretical volumes in which one ion must be produced to be active, the dimensions of the particles of bacteriophage can be estimated, and these agree closely with the figures determined by ultrafiltration technique.—ALFRED EDEN.

OHASHI, S. (1939). **Seasonal Change of the Bacteriophage-Occurrence in Feces of Animals and in Flies.**—*J. Shanghai Sci. Inst.* **4.** 141–150. 7 tables. [2 refs.] [In English]. [Abst. from author's summary].

A definite seasonal incidence was observed in the frequency of the occurrence of bacteriophage in faeces of laboratory animals and in flies. It occurs most frequently in spring, summer, and autumn, decreasing greatly in winter.

MORIYAMA, H., & OHASHI, S. (1938). **Minute-Body-Forming Protein of Animal Origin and Its Relation to Viruses.**—*J. Shanghai Sci. Inst.* Sect. IV. **3.** 341–352. 4 figs. [17 refs.] [In English].

Evidence is presented which indicates that certain animal cells such as testicle cells of a normal rabbit, and mouse brain and liver cells, appear to be composed of minute bodies which are lipoprotein in nature. It is suggested that the lipoprotein may be coagulated into minute bodies when the cells are isolated from the organ and brought under the ultramicroscope, and are

therefore not present as minute bodies in the normal state. An argument against this supposition is that red blood corpuscles and spermatozoa contain the lipoprotein in a dispersed state without the formation of minute bodies; but when these cells are exposed to certain physical or chemical influences, the minute particles are produced. The relation to viruses of this minute-body-forming protein isolated from normal cells is discussed, and it is suggested that lipoprotein coagulates into minute bodies through the stimulus of a virus and that, in the process, the minute bodies are endowed with the active radicle of the virus. The viruses, in affecting cells which have a natural affinity for them, may act by causing a denaturation of the cell lipoproteins, at the same time imparting to them the virus activity, or the virus radicle. It is concluded that the viruses can be regarded as coagulative agents or "denaturases" which are capable of multiplying. [See also *V. B.* **11.** 29.]—R. A.

PARASITES IN RELATION TO DISEASE [GENERAL]

KOFFMAN, M. (1940). Bidrag till kännedomen om parasiter hos husdjur och vilt i Sverige. II. [**Parasites of Domestic and Game Animals in Sweden. II**].—*Skand. VetTidskr.* **30.** 286–366. 71 figs. [Numerous refs.] [Abst. from author's English summary]. [For part I, see *V. B.* **11.** 232].

K. gives a review of the parasites discovered at the State Veterinary Bacteriological Institute during the period January 1st to June 30th, 1938, on examination of sheep, swine, cattle, and horses sent to the institute. As a rule, these parasites were fixed, stained, and photographed.

A description is given of the parasites and their development, together with an account of the steps to be taken to combat them.

In sheep the following parasites were encountered: ENDOPARASITES.—*Eimeria arloingi, E. faurei, E. intricata, Dicrocoelium lanceolatum, Fasciola hepatica, Moniezia expansa, M. denticulata, Cysticercus tenuicollis, Strongyloides papillosus, Trichuris ovis, Protostrongylus rufescens, Muellerius capillaris, Dictyocaulus filaria, Haemonchus contortus, Nematodirus filicollis, Trichostrongylus colubriformis, Chabertia ovina, Oesophagostomum venulosum,* and *Bunostomum trigonocephalum.* ECTOPARASITES.—*Melophagus ovinus.*

In swine the parasites found were: ENDOPARASITES.—*Eimeria debliecki, E. perminuta, Strongyloides papillosus, Trichuris trichiura, Metastrongylus elongatus, Oesophagostomum dentatum,* and *Ascaris lumbricoides.* ECTOPARASITES.—*Acarus suis.*

In cattle, the following parasites were found: *Eimeria zürnii, E. smithi,* and *Babesia bovis.*

In horses, the parasites found were: *Anoplocephala perfoliata, Setaria equina,* microfilariae, and *Oxyuris equi.*

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

GILL, D. A., & GRAHAM, N. P. H. (1939). **Studies on Fly-strike in Merino sheep. No. 3.—The Influence of Fly-strike and Conformation on Body-weight and Fleece-weight of Merino sheep at "Dungalear", New South Wales.**—*J. Coun. sci. industr. Res. Aust.* **12.** 319–329. 3 figs., 9 tables. [5 refs.] [For previous parts, see *V. B.* **9.** 782].

Blowfly strike in the breech causes a loss of body weight in young sheep, the extent depending on the severity of the attack. In a flock of sheep of A, B, and C classes of susceptibility [see *V. B.* **8.** 579.], blowfly strike during 1937–38 reduced the wool production by approximately 5 oz. per sheep. Unstruck class A sheep produced 11 oz. less wool than unstruck class C sheep; when the effect of strike was included, classes A and B produced 4 oz. less wool per sheep than the most susceptible class C sheep.—R. P. HOBSON.

LENNOX, F. G. (1939). **Studies of the Physiology and Toxicology of Blowflies. I. The Development of a Synthetic Medium for Aseptic Cultivation of Larvae of** *Lucilia cuprina.*—*Pamphl. Coun. sci. indust. Res. Aust.* No. 90. pp. 24. 8 text-figs., 2 figs. on 1 plate, 8 tables. [17 refs.]

L. describes a technique for rearing blowfly larvae aseptically, together with suitable media.
—R. P. HOBSON.

GOODRICH, A. L., Jr. (1940). **Starling Attacks**

upon Warble infested Cattle in the Great Plains Area.—*J. Kans. ent. Soc.* **13.** 33–40. [22 refs.] [Abst. in *Rev. appl. Ent.* **28.** 207–208, copied *verbatim*].

The harmful and beneficial activities of the starling (*Sturnus vulgaris*), which was introduced into the United States towards the end of the nineteenth century, are discussed from the literature. Throughout the winters of 1937 and 1938, stockmen in two counties in Kansas stated that they had seen starlings apparently extracting larvae of *Hypoderma* from warbles in the backs of cattle; and numerous reports were made in several of the mid-western States in January 1940 that these birds were not only attacking the warbles, but also feeding on the surrounding flesh, making large and deep wounds and causing herds to stampede. They also fed on cattle bearing brand wounds. The attacks in 1940 were associated with a severe and prolonged period of cold weather and snow throughout the Middle West. Experiments have indicated that a high degree of relief from starling attack may be obtained by squeezing the larvae from the warbles as soon as they are large enough to make this practicable, and it has been suggested that small herds should be treated three times, and large herds at least twice, during the late winter months. This permits the early healing of the breathing aperture and prevents the making of a flesh wound or infection of the warble by attacks by the birds. It is thought, however, that the combination of abundance of starlings and extremely severe weather at the time when the warbles are present on the backs of the cattle, which was responsible for the heavy starling attacks of January 1940, may not soon recur.

I. SANDERS, D. A. (1940). *Musca domestica* **and** *Hippelates* **Flies—Vectors of Bovine Mastitis.**—*Science.* **92.** 286.

II. SANDERS, D. A. (1940). *Musca domestica* **a Vector of Bovine Mastitis (Preliminary Report).**—*J. Amer. vet. med. Ass.* **97.** 120–122. 3 figs. [8 refs.]

III. SANDERS, D. A. (1940). *Hippelates* **Flies as Vectors of Bovine Mastitis (Preliminary Report).**—*Ibid.* 306–308. 1 fig. [5 refs.]

I. A short note summarizing the two papers which follow.

II. Observations on the feeding habits of *M. domestica* revealed that it was a persistent feeder at the openings of the teat ducts of milch cattle. The insect was also observed to fly from the udder of one animal to those of neighbouring animals and recommence feeding at the teat orifices. It was noted, too, that the flies commonly fed on waste milk accidentally spilled on the floor of the cowshed. These indiscriminate feeding habits of *M. domestica* suggested that the insect could serve as an excellent vector of bovine mastitis.

S. briefly outlines transmission experiments which were undertaken. Alternate feedings on infected material and on the teat orifices of mastitis-free cattle were made, while in other instances the teat orifice was exposed to insects taken directly from premises where mastitis was prevalent. Mastitis developed in each of the experimental animals by the exposure technique employed. Active infections were readily developed in udders where the secretion was allowed to remain in the quarters as occurs naturally during the drying-off period prior to calving.

III. *Hippelates* spp. (fruit fly or gnat fly) were noted feeding at the natural orifices of cattle, and, in particular, around and at the teat orifices. Stained smear preparations of *Hippelates* obtained from the vicinity of mastitis-infected udders showed the presence of organisms resembling those observed in cases of bovine mastitis. Transmission experiments showed that *Hippelates* is capable of spreading bovine mastitis. In addition, S. states that the possibility exists that *Hippelates* also serves as a reservoir of bacterial species capable of inducing mastitis.

[S. gives no indication of the bacteria for which *M. domestica* and *Hippelates* serve as vectors nor of the type of mastitis caused. No details are given of the number of cows used in the transmission experiments nor of the methods employed for the diagnosis of infection.]—N. J. SCORGIE.

—. (1936). **Fly Survey in the Nuba Mountains in Connection with Trypanosomiasis [Sudan].**—*Rep. Gezira agric. Res. Serv., 1935.* pp. 94–96.

This survey had been going on in the rainy season of each year since 1933. One of its objects was to find out what biting flies other than the tsetse fly (*Glossina morsitans*) attack cattle at this period, causing the mortality from trypanosomiasis. These flies included two species of *Stomoxys* and several of *Tabanus*; *Culicoides* spp. also occurred, together with an increased number of mosquitoes.

Native opinion suggests that cattle are more exposed to the disease in the plains than in the hills.

OSWALD, B. (1940). O prepoznavanju krpelja (Ixodoidea) u Jugoslaviji. [**Distribution of Ticks in Yugoslavia**].—*Vet. Arhiv.* **10.** 297–304. [Numerous refs.] [Abst. from English summary].

O. gave an account of 28 ticks that occur in Yugoslavia, and made keys for the determination of the adult males and females of 22 species. In the case of one tick, only the nymph stage has been found. The key is in both the Serbo-Croat and English languages.

—. (1939). **Report of the Committee on Tick Eradication.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass., 1938.* pp. 63–65. 1 table.

Eradication of the cattle fever tick had resulted during the year in the release from quarantine of 10,904 sq. miles of territory in Florida and Texas and 1,243 sq. miles in Puerto Rico. Satisfactory progress had been achieved in reducing the numbers of deer in affected areas in Florida. Small foci of reinfestation in previously free areas had occurred in some states. In the whole country 98% of the area originally quarantined in 1906 had now been released and there remained only an area of 14,488 sq. miles in Florida and Texas.

—H. E. HARBOUR.

BERTRAM, D. S. (1939). **The Structure of the Capitulum in *Ornithodoros*: a Contribution to the Study of the Feeding Mechanism in Ticks.**—*Ann. trop. Med. Parasit.* **33.** 229–258. Numerous figs. [Numerous refs.]

In 1935, SEN [*V. B.* **6.** 427.] reported the presence in the buccal cavity of ticks of a tubular organ which he held to be a continuation of the pharynx and to represent the sucking apparatus. B. has investigated in detail the buccal apparatus of *Ornithodoros* and finds that this organ is actually a closed pouch. He suggests that its function is apparently to prevent regurgitation of blood into the wound, and also possibly to assist ejection of saliva from the salivary ducts.—J. MACLEOD.

LUCAS, G. C. (1940). Demodex Folliculorum Bovis (Stiles) Gros. Contribución al estudio histo-patológico parasitológico de la sarna follicular de los bovinos. [*D. folliculorum bovis.* **Histopathology of Follicular Mange in Cattle**].—*Rev. Med. vet., B. Aires.* **22.** 448–461. 22 figs., 1 chart. [Numerous refs.]

This paper is largely of historical and biological interest, but a number of photographs illustrate L.'s description of the lesions found in affected cattle. He emphasizes that in cattle secondary bacterial invasion of affected follicles seldom occurs, but he contributes no new information.—MILLER WATSON.

FIORDA, H. (1940). Sarna "escamosa-oculta" de los lanares. (Nueva forma clinica de sarna ovina en Patagonia.) [**A New Form of Mange in Sheep**].—*Rev. Med. vet., B. Aires.* **22.** 583–588.

F. describes a peculiar form of mange caused by *Psoroptes ovis* in southern Patagonia. Affected sheep show no signs of pruritus and scratching is not a symptom. The skin of the whole body may be covered by a crust of desquamated epithelium about 2 mm. thick, which, when rubbed, falls off in large scales like soap flakes. The fleece is usually intact as the sheep does not rub itself, but the wool is lustreless and whiter than usual. The sheep lose weight rapidly. Both lambs and adult sheep are attacked.

It is apparently difficult to see affected sheep in a large flock, and F. describes a method by which they can be detected. The sheep are run through a crush each sheep being seized by the wool as it passes. Healthy animals pass on normally, but those affected by mange fall to the ground immediately on being released and are attacked by a fit of trembling. When affected sheep are dipped, they must be allowed to swim through the bath, for if they are touched in any way a trembling fit may cause them to sink.—MILLER WATSON.

REIS, J. (1939). Alguns parasitas de "Gallus gallus (L.)" verificados em São Paulo. [**Mites of Domestic Fowls in São Paulo**].—*Arq. Inst. biol., S. Paulo.* **10.** 147–152. 2 text-figs., 2 figs. on 1 plate. [16 refs.] [Abst. from author's English summary].

R. reports the occurrence of four parasites in domestic fowls, in the state of São Paulo, Brazil. *Rivoltasia bifurcata*, which causes a mild type of mange in pullets, is recorded for the first time in Brazil. A description is given of the posterior lobes of the male of this parasite.

Dermanyssus gallinae, which in Brazil is usually found as a parasite of cage-birds, was

reported for the first time as a fowl parasite. The common fowl mite in Brazil is *Liponyssus bursa*.

Heavy infestations by *Megninia columbae* have been found twice in 6,553 birds examined. R. describes the damage caused by this feather mite, which is similar to that caused by common lice.

Although calcareous formations resembling those ascribed to *Laminosioptes cysticola* are frequently met with in P.M. examination of birds, R. has only once found this parasite associated with such formations.

DIAS, E. (1938). Depositarios naturaes e transmissores da febre maculosa brasileira. **[Natural Hosts and Vectors of Brazilian Exanthematic Typhus]**.—*Brasil-med.* **52.** 269–272. [26 refs.]

A review is given of information on reservoir hosts and insect vectors of human rickettsial infections of the Rocky Mountain fever type, and concludes that in Brazil it has been established that the opossum, two rodents (*Cavia aperea* and *Sylvilagus minensis*), and domestic dogs are the animals involved. In the case of the first three, virus has been definitely demonstrated, whilst in dogs it has been found that animals in endemic areas may give positive Weil-Felix reactions and ticks collected from them may contain virus. Dogs have been proved susceptible to virus, but their infection is symptomless or nearly so. Epidemiological studies point to them as the commonest source of human infection.

The tick, *Amblyomma cajense*, is thought to be the most important vector of human disease, whilst *Rhipicephalus sanguineus* may maintain infection in dogs, and various species of *Ixodes* and *Haemaphysalis* may act as vectors in the case of the wild hosts.—U. F. RICHARDSON.

PARASITES IN RELATION TO DISEASE [HELMINTHS]

SOBRINHO, A. S. O. (1939). Um caso de esticorcose suina verificado no matadouro de Guarulhos. [*Stichorchis* **Infestation in Swine at the Abattoir in Guarulhos**].—*Rev. industr. Anim.* **2.** No. 1. 158–160. 1 fig. [3 refs.]

S. reports an intestinal infestation with the amphistome, *S. giganteus*, in a pig slaughtered at Guarulhos. He had previously found one other case of parasitism by this trematode and comments on its rarity.

The intermediate host of this parasite is still not known, but S. suggests that it must be of rare occurrence, since the infested pig examined was one of 200 from the same piggery and no other animal was infested.—MILLER WATSON.

SHORB, D. A. (1940). **A Note on the Effect of Tapeworm Infestation on the Condition of Sheep.**—*Vet. Med.* **35.** 180–181. 1 fig., 2 tables. [3 refs.]

The carcasses of 113 sheep, of which 42 had been found P.M. to be free of helminths, and 71 to carry only tapeworms, were graded by experts as to condition. S. found that considerable numbers of *Moniezia* and *Thysanosoma* were relatively non-pathogenic either in pure or mixed infestations. The results of the investigation tended to show that the better grade animals harboured more parasites.

—A. L. WILSON.

SIMOES, A. (1939). Cisticercose . . . ainda . . . e sempre. **[Swine Cysticercosis in Portugal]**.—*Rev. Med. vet., Lisboa.* **34.** 161–167. [5 refs.]

In this paper S. deplores the high percentage of swine cysticercosis in Portugal. He accounts for this condition by the very poor sanitary arrangements in large areas of the country and appeals for strong measures of correction.

—MILLER WATSON.

BARNETT, L. (1940). **The Incidence of Hydatid Disease in New Zealand and Elsewhere.**—*N. Z. med. J.* **39.** 330–338. 1 fig., 4 tables. [Numerous refs.]

This is largely a review article. It gives the incidence of hydatid in human beings and the mortality rate. In New Zealand, 624 people have died from this condition in the 49-year period up to the end of 1939. The incidence in cattle and sheep in New Zealand is high, being over 40%.—LEWIS FITCH.

LUCKER, J. T. (1940). **Treating Horse-Stable Manure with Steam to Kill Parasite Eggs and Larvae.**—*J. Amer. vet. med. Ass.* **96.** 188–194. 2 figs., 1 table. [4 refs.]

Three different series of experiments were carried out with boxes of different capacity. The faeces to be examined were divided into two lots in each case, one lot being treated with steam while the other was used as a control.

In the preliminary experiments a double-walled box of 12 cu. ft. capacity was used. The

space between the walls was 3½ in. wide and was insulated with sawdust. The interior of the box was lined with tin, and steam was distributed throughout the manure by a W-shaped coil of perforated pipe resting on the floor. Temperature readings were taken by means of thermometers inserted through the sides of the box. With this box, steaming for 30–35 min. with a maximum boiler pressure of 15 lb., or for 15–25 min. at 25 lb. pressure, destroyed the vitality of all strongyle larvae and eggs in the manure.

Two larger boxes of 145 cu. ft. capacity were then used. Their construction was similar to the former box except that they were not lined by tin. Subsequent examination of the faeces showed that steaming for 1½–6½ hours killed the larvae and eggs in the centre of the mass but left those at the sides and corners unharmed.

For the third series of experiments a metal-lined box of 91 cu. ft. capacity was used. The steam in this case was distributed throughout the manure by coils of perforated pipe on the sides, back, and floor of the box. The effective steaming period varied from 10–35 min. at 95°C., the total steaming time in successful tests varying from 1½ to slightly more than 2½ hours. Ascarid eggs were killed in two of the samples, and tests with this box were successful even at an atmospheric temperature approaching freezing point.—A. L. Wilson.

Foster, A. O., & Habermann, R. T. (1940). **Endoparasites of Aged Horses and Mules at the Beltsville Research Center of the U. S. Department of Agriculture.**—*Proc. helminth. Soc. Wash.* **7.** 85–87. [8 refs.]

Parasites were recovered from 13 horses and one mule by dosing with phenothiazine. Probably none of the animals was less than ten years old. The parasites found are named.

In nine of the animals the number of large strongyles varied from none up to 40, while cylicostomes numbered from 8,122–81,962, the average being 12 large strongyles and 32,625 cylicostomes per animal. One other animal passed 32 large strongyles and 106,790 cylicostomes after treatment with phenothiazine.

It is stated that 1,000 strongylids represent a light infestation, and that this is the minimum infestation obtainable under the best methods of parasite control. Infestations with up to 30,000 worms probably do not cause noticeable symptoms, while infestations with 50,000 parasites and over may cause typical symptoms of strongylosis in the average horse.

A short list of parasites previously witnessed in the U.S.A. is also given.—A. L. Wilson.

Mayhew, R. L. (1940). **Studies on Bovine Gastro-Intestinal Parasites. II. Immunity to Hookworm and Nodular Worm Infection in Calves.**—*J. Parasit.* **26.** 345–357. 2 plates. [16 refs.] [For part I, see *V. B.* **11.** 168].

The methods used for the experiments recorded in this paper have been outlined in a previous paper [*V. B.* **11.** 168].

Three calves showed an immunity to a mixed infection of *Bunostomum phlebotomum* and *Oesophagostomum radiatum*, induced by previous infection. In a fourth calf, immunity was noted to a pure infection of nodular worms. The development of immunity bore no relationship to the age of the host, the length of the period of previous infection, or the degree of infection as indicated by the egg count. Immunity appeared to be of only a temporary nature in one of the calves, but three other animals were more resistant and retained their immunity over a period of six months.—M. L. Bingham.

Robertson, D. (1940). **The Worm Burden of Fat Lambs and the Diagnosis of Gastro-Intestinal Helminthiasis.**—*Vet. Rec.* **52.** 553–555. 1 table, 1 chart. [7 refs.]

Two lambs were autopsied each month between June 1937 and April 1938. *Ostertagia* and *Trichostrongylus* spp. were recovered from all the lambs. Infestations with *Haemonchus* were again found to be almost negligible [see also *V. B.* **10.** 680]. *Nematodirus* occurred in the greatest numbers, up to 5,680 specimens per lamb, such heavily infested lambs being in poor condition and anaemic. *Chabertia* was also quite common, and in one lamb appeared to have some pathogenic action.

Ostertagia showed a relatively high incidence during summer which declined towards winter. The peak incidence of *Nematodirus* was reached in November and fell gradually during the winter; the parasite had practically disappeared from lambs nine months old. This disappearance is stated to be due to acquired immunity and not to age resistance. The numbers of *T. axei* were fairly constant throughout the year, there being no evidence of an immunity. The high incidence of *Chabertia* during the winter

is explained by the marked resistance of the infective larvae to adverse conditions.—A. L. W.

GREGORY, P. W., MILLER, R. F., & STEWART, M. A. (1940). **An Analysis of Environmental and Genetic Factors Influencing Stomach-Worm Infestation in Sheep.**—*J. Genet.* **39.** 391–400. 3 figs.

The authors examined for trichostrongyle eggs the faeces of 11 ewes sired by one ram and 22 sired by another. The examinations were made weekly for two months. The ages of the ewes were known, and varied from 1 year and 8 months to 4 years and 8 months.

The results indicate that (1) there is an autumnal peak of infestation, this occurring slightly later in the year in animals under two years old; (2) ewes under two years old are more susceptible to infestation than older animals, and (3) resistance is affected by genetic constitution, this having been found to be the most important of the three factors which bear on the degree of infestation: it appeared both that individual siblings exhibited marked variations in degree of susceptibility and that as a whole the progeny of one ram were significantly less susceptible than the progeny of the other. Conclusions (1) and (2) were found to be statistically significant.

The authors suggest that while the results are conclusive statistically, further work is desirable owing to the limited number of animals involved in their experiments.

—K. M. SANDERSON.

YUTUC, L. M. (1940). **A Note on Resistance Studies with the Nematode, Nippostrongylus muris (Yokogawa, 1920) in Laboratory Piebald Rats.**—*Philipp. J. anim. Indust.* **7.** 147–152. 2 tables. [Numerous refs.]

This report, on the nature of the resistance of rats to *N. muris*, is an extension of Y.'s investigations on the influence of splenectomy on natural and acquired resistance of rats to *Nippostrongylus* infection. As a result of one experiment it is suggested that the age resistance exhibited by mature animals is dependent on the fact that older animals acquire an immunity more rapidly than younger ones. A second experiment showed that an initial injection of 50 living larvae per g. body weight was sufficient to immunize rats against a subsequent lethal dose of 150 larvae per g. body weight.

—M. L. BINGHAM.

I. WRIGHT, W. H. (1939). **Studies on Trichinosis. XI. The Epidemiology of *Trichinella spiralis* Infestation and Measures Indicated for the Control of Trichinosis.**—*Amer. J. publ. Hlth.* **29.** 119–127. 2 figs., 5 tables. [8 refs.] [For previous parts, see *V. B.* **8.** 449; **10.** 850, and **11.** 33].

II. WRIGHT, W. H. (1939). **Studies on Trichinosis. IX. The Part of the Veterinary Profession in the Control of Human Trichinosis.**—*J. Amer. vet. med. Ass.* **94.** 601–608. [11 refs.]

I. Diaphragms of 3,000 human beings of diverse occupations and races were examined from bodies autopsied at a number of hospitals. The results gave a high incidence of 17% infested with trichinae, and W. concludes that one in six of the population of the U.S.A. is thus infested. He believes that the rat is overstated as a source of swine trichinosis.

Various measures are suggested for the control of the disease, *e.g.*, microscopic examination of pork (cost prohibitive), refrigeration of all pork at 5°F. for 20 days, and the intradermal test for detecting trichinous swine with the refrigeration of carcasses from reactors.

II. W. replies to criticisms raised against his contention that 17% of the population of the U.S.A. are infested with trichinae. He reiterates the principles of the control of swine trichinosis and considers the most logical approach to the problem is the control of garbage feeding.

[The low incidence of trichinosis in Great Britain may, perhaps, be due in part to the enforcement of the Foot and Mouth Disease (Boiling of Animals' Foodstuffs) Order, which requires that all waste foodstuffs fed to pigs must first be boiled for at least one hour, and that such material when uncooked must be kept away from pigs.]—H. E. BYWATER.

DE BRITO GUTERRES, J. (1939). Estefanurose porcina na Ilha de S. Tomé e na provincia do Sul do Save da colónia de Moçambique. [*Stephanurus* **Infestation of Pigs in Mozambique**].—*Rev. Med. vet., Lisboa.* **34.** 232–236.

The author reports that 99·9% of pigs slaughtered on the island of S. Tomé were infested with *S. dentatus*, whilst in the province of Sul do Save in Mozambique about 50% were affected. In the former locality the worms were found in the liver as often as in the kidney,

while in Sul do Save the parasites were usually found in the perirenal situation.

No new knowledge is contributed on the subject of prophylaxis and treatment.—M. W.

SIMITCH, T., KOSTITCH, D., & MLINAC, E. (1938). Sur une nouvelle filaire du chien dans la Serbie du Sud. **[A New Filaria from Dogs in Southern Serbia].** —*Ann. Parasit. hum. comp.* **16.** 22–27. 4 figs.

Of 165 dogs examined in Skoplje, 74 were found to be infected with filariae which differed from any that have hitherto been described from the dog. In dogs which showed microfilariae in the peripheral blood, adult parasites were always found in nodules under the muscular coat of the thoracic oesophagus, except in one case in which they occurred in a nodule in the lung, but larvae could not always be demonstrated in the blood stream of dogs which harboured adult worms. The parasites are described but not named. The chief vector appears to be *Anopheles maculipennis* of which 3% are infected in this district of Southern Serbia.—M. L. BINGHAM.

BRUYNOGHE, G. (1939). Recherches sur les propriétés antigéniques des microfilaires de *Dirofilaria immitis*. **[Antigenic Properties of Microfilariae of** *D. immitis***].**—*Ann. Soc. belge Méd. trop.* **19.** 335–353. 1 table. [Numerous refs.]

A total of 890,000 microfilariae was injected intravenously into each of two rabbits during the course of a month and their blood was examined serologically for specific antibodies. 1% aqueous extracts of *D. immitis* and of an *Ascaris* [specific name not given] were used for precipitation and intradermal tests. Complement-fixation tests were carried out with an alcoholic extract of *D. immitis*. In all cases the results were negative.

Two living adult male and female *D. immitis* were then introduced into the peritoneal cavity of a rabbit and the blood was examined for two months for eosinophilia and the presence of microfilariae. The examinations were negative and on P.M. examination of the rabbit the parasites were found in a calcified condition, surrounded by fibrous tissue.

Somewhat similar experiments were carried out in g. pigs, again with negative results.

Two young dogs each received 1,330,000 microfilariae, a slight degree of cutaneous sensitization being produced, although examination of their sera for antibodies by means of the complement-fixation test gave negative results.

The sera of human patients infested with *Loa loa* gave positive results in all cases with an antigen prepared from *D. immitis*, thus confirming the value of the Fairley test for this parasite.

The test does not seem to have the same value when applied to human *Acanthocheilonema perstans* infestation, since only two out of the five tests on affected persons were positive. —A. L. WILSON.

GALLIARD, H., & DANG-VAN-NGU. (1938). Variations saisonnières de l'évolution de *Dirofilaria immitis* chez *Aedes* (*Stegomyia*) *albopictus*. **[Seasonal Variations of the Development of** *D. immitis* **in** *A. albopictus***].**—*Ann. Parasit. hum. comp.* **16.** 210–214. 5 figs. on 1 plate, 3 charts. [4 refs.]

During the hot season in Tonkin, when the temperature ranges between 24° and 37°C., microfilariae of *D. immitis* develop readily in 80–100% of *A. albopictus* as well as in *A. aegypti*. Full development is reached in 8–9 days in summer but may take a month during the winter at 12°–18°C. Although the percentage of infected mosquitoes during winter is very low, development may occur throughout the year.—M. L. BINGHAM.

CHATTERJI, R. C. (1939). **Report on Two Unrecorded Nematode Parasites from Domesticated Animals of India or Burma.**—*Indian J. vet. Sci.* **9.** 323–332. 6 figs. [16 refs.]

A detailed description is given of two nematodes recorded for the first time from Rangoon and its suburbs. The first, *Acuaria* (*Cheilospirura*) *hamulosa* Diesing, 1851, which occurs between the tunics of the gizzard of fowls, is of cosmopolitan distribution. The second, *Setaria bernardi* Railliet and Henry, 1911, found in the peritoneal cavity of pigs, has previously been reported only from Annam. C. differentiates the latter from *S. congolensis*, held by some authors to be synonymous, on the position of the caudal papillae, the length of the oesophagus, and the character of the spicules. [There is an error in the caption to fig. 5, which should read " Posterior end of *male* ".]

M. L. BINGHAM.

IMMUNITY

HEIDELBERGER, M. (1940). **Recent Chemical Trends in the Study of Immunity.**—*Chemistry and Medicine.* pp. 139–156. [7 refs.] Minneapolis: University of Minnesota Press.

There is a brief discussion of factors affecting the antigenic behaviour of proteins, and the creation of new specificities, which sometimes even overshadow the original species specificity, by the introduction of halogen, nitro- or diazotized aromatic amino groups into the cyclic nuclei of proteins, or by modification of the free amino groups in various ways. This is followed by a consideration of protein antigens of importance in infectious diseases. The chemistry of circulating antibodies is then discussed and the theory of formation put forward by BREINZL and HAUROWITZ, and later by MUDD, is favoured. According to this view the synthesis of normal serum globulin may occur in such a way that the spatial configuration of the cellular protoplasm impresses upon the globulin the species-specific properties characteristic for the animal in question. Penetration of injected antigen to the sites of this synthesis, which according to SABIN are the phagocytic cells of the liver, spleen, tissues, and lymph nodes, distorts the normal spatial relationships in a manner characteristic of the foreign material so that any more globulin synthesized in this distorted manner bears a certain spatial resemblance to the antigen. If the new globulin molecules again encounter the antigen in the circulation, or *in vitro*, interaction may occur. Put more briefly, antibody formation simply represents the synthesis of a variation of normal globulin by the same cells under the influence of an antigen.

Studies are then discussed in which micromethods for the estimation of antigens and antibodies, conforming to the criteria of analytical chemistry and yielding accurate data in terms of milligrams, regardless of the presence of non-specific protein, take the place of serological dilution methods with their large capacities for error.

The precipitin reaction between the specific polysaccharide of type III pneumococcus and the partially purified antibody from type III antiserum is considered in detail, and the series of reactions finally expressed in terms of equations. Micro-analytical methods are also used for the estimation of agglutinins and the entire course of both precipitin and agglutinin reactions accounted for on the basis of chemical reactions between multivalent antibody and multivalent antigen, without assumptions as to electrical potential or cohesive force.

As a practical example of the value of micro-analytical control there are now available sera and purified antibody solutions, corresponding to *Haemophilus influenzae* type B, of 5–10 times the antibody content of the best available at the inception of the methods.

Studies of highly purified antibody-globulin solutions by ultracentrifuge technique are also discussed. From these emerged, amongst other observations, the interesting indication of entirely different mechanisms for the production of pneumococcus anti-carbohydrate in different animals, *e.g.* the horse and the rabbit. Pneumococcus anti-carbohydrate and anti-egg albumen engendered in the rabbit have the same molecular size as that of the principal component of normal serum globulin, while the former antibody, as produced by the horse, cow, and pig, has a molecular weight six times as great, corresponding to a minor component also present in all normal sera. The new information formed from this work has had its practical repercussions in furnishing the theoretical background and actual methods of control for the use of anti-pneumococcus rabbit sera in the treatment of pneumonia.

An additional result of quantitative precipitin and ultracentrifugal studies is the possibility, now that molecular weights of reactants are known, of writing empirical formulae for the composition of specific precipitates, *e.g.* Antg. Antb. or Antg. $(Antb.)_6$. The treatment of agglutination as a single chemical reaction also places the effect of salts in a new light.—H. H. GREEN.

VELLISTO, E. (1939). Die Bedeutung des Antigens für die Agglutinationsreaktion und das "absolute Verfahren" der Agglutinationsprobe. [**Importance of the Antigen for the Agglutination Reaction and the "Absolute Procedure" in the Test**].—*Zbl. Bakt. I* (*Orig.*). **144.** 375–402. 6 tables. [Numerous refs.]

V. has studied the various factors which may influence the result of an aggln. test made with brucella suspensions and sera, his main findings being as follows. The titre is strongly influenced by the bacterial content (opacity) of the

test suspension and by the duration of incubation. According to V. it is increased in inverse proportion to the opacity of the suspension, *i.e.* if the opacity is decreased by half, the titre is doubled and so on. Readings made at three or two days are considerably higher than those made one day after the setting up of the test. The temperature is not of major importance unless readings are to be made at 24 hours or earlier when preliminary or continuous incubation at 37°C. (or 55°C.) gives higher titres than incubation at room temperature; inhibition zones occur, however, in some cases at 37°C. and above. Strains of *Brucella* are in general of similar agglutinability but all should be tested and exceptional strains avoided in suspension preparation. Suspensions keep their agglutinability for at least three years. Living suspensions and those killed by heating at 60°C. or by means of phenol or formalin have a similar agglutinability. The presence of agar in the suspension must be avoided.

The agglutinin content of a serum cannot be sufficiently indicated by giving a titre. It is necessary also to give the opacity of the test suspension. For exact work the "absolute titre" (*i.e.* according to V. the highest titre attained before nonspecific sedimentation occurs *e.g.* after three days) should be used.

[The value of a standard dried *abortus* serum as a yard stick for measuring the actual agglutinability of a test suspension might with advantage have been dealt with. Such a standard dried serum has been in use for some years in work done for the Agricultural Research Council, United Kingdom.]

—A. W. STABLEFORTH.

DE MENDONÇA MACHADO, A. (1936). Estudo comparativo de alguns métodos de obtenção de soros de leite e sua importância no diagnóstico das bruceloses. **[The Importance of the Method of Obtaining Whey when it is used for Agglutination Tests for Brucella Infection]**.—*Repos. Lab. Pat. vet., Lisboa.* **3.** 3–49. 12 tables. [13 refs.] [French and English summaries].

In choosing reagents to precipitate the caseinogen from milk, due regard must be paid to the quantity and quality of the whey obtained and to the inaction of the reagents in the subsequent agglutination tests. M. gives preference to the use of rennet plus chloroform or carbon tetrachloride. 1 c.c. of rennet and 1 c.c. of reagent are added to 10 c.c. of milk in a centrifuge tube. After vigorous shaking the mixture is incubated at 37°C. for one hour. From 2·5–5·0 c.c. of whey can be recovered by centrifugation.

Of 203 cows and goats, including both infected and non-infected animals, 79% of the cows and 88% of the goats which had positive blood titres also had agglutinins in the whey. Two goats had agglutinins in their whey but blood tests were negative.—J. S. PATERSON.

MELLO, A., & ROGICK, F. A. (1938). Teôr em aglutininas do sangue da veia mamária e da veia jugular, na brucelose. **[Agglutination Tests of Blood from the Mammary Vein and from the Jugular Vein in Brucellosis]**.—*Rev. industr. anim.* **1.** No. 4. 150-158. 8 tables. [12 refs.] [English summary].

Comparative tests on jugular vein blood and mammary vein blood on 300 animals in infected herds resulted in complete agreement with positive results in 207 pairs of samples; 14 jugular vein samples and 10 mammary vein samples were independently positive. A slight difference in titre was observed between samples from the two sources, in a few cases, where both were definitely positive.

TALIAFERRO, W. H. (1940). **The Mechanism of Acquired Immunity in Infections with Parasitic Worms.**—*Physiol. Rev.* **20.** 469–492. [Numerous refs.]

T. reviews the work done on immunity to infections with parasitic worms, and discusses the more important ideas and differences of opinion of investigators, illustrating these by reference to the worms in connexion with which this phenomenon has been most studied, *i.e.* *Taenia taeniaformis*, *T. pisiformis*, *Echinococcus*, *Nippostrongylus*, *Ancylostoma*, and *Trichinella*.

T.'s conclusions on this subject are summarized at the end of the review. He reaffirms that the immunological mechanisms operative against helminths are fundamentally identical with those operative against other antigenic agents, and states that worms are of particular value for studies on general immunology, because of their large size. He points out that immunity rests immediately on humoral factors, with secondary cellular co-operation, and that precipitins are responsible for the immobilization, delay in development and inhibition of enzyme activity of the worms. He also stresses that although enzymes are definitely antigenic, further work is necessary on the production and

the reactions of anti-enzyme antibodies.

—K. M. SANDERSON.

RODRIGUEZ LOUSTAU, J. A. (1940). Fenómenos de hipersensibilidad o " reaccion sérica " en los bovinos. [**Hypersensitivity and Serum Sickness in Cattle**].—*Rev. Med. vet., B. Aires.* **22.** 462–468. [4 refs.]

A description of hypersensitiveness to serum in three bovines.

In 1937 a number of young cattle received anti-anthrax inoculation in Buenos Aires. Each animal received 25 c.c. of serum and two hours later one animal showed alarming symptoms. It was a shorthorn bull of about 20 months of age and it showed intense dyspnoea with a pulse at first feeble and then hard. There was pronounced mydriasis and conjunctivitis, accompanied by a slight fall in temperature. The animal staggered although it did not fall. Calcium was given intravenously, and the animal recovered.

In 1939 there was another and very similar case and in 1940 a third. In the last case the symptoms of shock appeared early on the day following inoculation. In none of these cases was R. able to discover whether the animals had been previously sensitized by injection of serum and so it is not clear whether they were true cases of anaphylaxis or of natural allergy such as occurs among human beings.

—M. WATSON.

EVANGELINOS, P., & WOHLFEIL, T. (1939). Ueber Bakterienautolyse und deren Bedeutung für bakterielle Impfstoffe. [**Bacterial Autolysis and its Importance for Bacterial Vaccines**].—*Zbl. Bakt. I.* (*Orig.*) **144.** *129–*135. 1 fig., 4 tables.

The authors have studied some of the factors affecting autolysis. Suspensions of *Bacterium coli* and *Proteus vulgaris* were used and the degree of autolysis was determined by micro-Kjeldahl nitrogen estimations after high-speed centrifugation.

The effects of temperature, various solutions of sodium salts, age, etc. were tested. Much greater autolysis was observed in certain vaccines, *e.g.* in typhus and cholera vaccines prepared several years previously than in those of more recent date. It is not suggested, however, that this implies any reduction in value. A further report is promised.—A. W. S.

CANNON, P. R., & MARSHALL, C. E. (1940). **An Improved Serologic Method for the Determination of the Precipitative Titers of Antisera.**—*J. Immunol.* **38.** 365–376. 3 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

A method has been described for the determination of the precipitative strength of an antiserum, utilizing the combined methods of agglutination of collodion-particles coated with a purified protein, and the resuspension-agglutination technic. It is possible in this way to determine precipitative titers simply and accurately by serial dilution of the antiserum, as with other serologic procedures. Because of the simplicity of the collodion-agglutination method, relatively large numbers of antisera can be quickly and conveniently titrated and their precipitative strengths determined and compared with the skin-reactivity of the animals from which the serums were secured. The method is sharply specific, and is delicate enough to demonstrate the presence of precipitins in sera so weak that no visible precipitate occurs when they are mixed with varying dilutions of specific antigen. By this method, specific precipitins have been demonstrated in sera from patients hypersensitive to egg-protein, tuberculin and crystalline-insulin. There is reason to hope, therefore, that it may be of value for the quantitative study of the relationship of precipitins to various types of hypersensitive reactions.

HILLESHEIM, H., NUTI, M., & SPINA, G. (1939). Produzione di emolisine antibal in animali vaccinati con lipoidi tubercolari. [**Production of Haemolytic Antibodies in Animals Inoculated with Tuberculous Lipoids**].—*Ann. Inst. Carlo Forlanini.* **3.** 838. [Abst. in *Tubercle, Lond.* **21.** 246, copied *verbatim*].

The authors studied the reduction of haemolytic antibodies in rabbits treated by combined injection of lipoid fractions of the Vallée bovine tubercle bacilli (phosphatides, soluble acetone lipoids and wax), and bovine red corpuscles, and found that this production was much greater than in controls. The production of serum obtained from animals injected with soluble acetone lipoids was particularly high.

GOTTSCHALL, R. Y., & BUNNEY, W. E. (1940). **The Effect Of Age on the Spread of Dye in the Skin of Normal, Antigenically Stimulated, and Tuberculous Guinea Pigs.**—*J. Immunol.* **38.** 345–353. 4 tables. [7 refs.]

Experimental results show that the rate of spread of intradermally injected dye (trypan-blue) was much less in normal old g. pigs than in normal young animals. In tuberculous animals the spread of the dye was less in the case of young g. pigs when compared with normal controls, but there was no significant difference in the rate of spread of the dye between tuberculous and normal old g. pigs. A comparison of the rate of spread in young tuberculous animals and in young animals immunized with alum-precipitated diphtheria toxoid showed that the immunization had no influence on the rate of spread of the dye.

The results of a small series of experiments indicate that subcutaneous or intra-abdominal injection of dead tubercle bacilli into young g. pigs retards the rate of spread of dye as compared with the rate in young normal animals.—R. ALLCROFT.

IWATA, S. (1939). **Hydrogen Ion Concentration within Hystiocytes in their Phagocytic Function of Bacillus Tuberculosis.** —*J. orient. Med.* **30.** 253–254 of European absts. [In English].

A measure of the degree of pH within histiocytes in the peritoneal cavities of mice inoculated intraperitoneally with living strains of the acid-fast bacilli, was made by means of vital staining with pH indicator dyes. The histiocytes with a pH of 5·2–6·4 were described as the active form, those with a pH of 6·4–6·8 as the normal form, and those with a pH of 6·8–7·6 as the degenerative form. When Frankfurt human type tubercle bacilli and bovine type No. 1 were injected there was found to be about 50% of the active form of hystiocytes present, about 30% of the normal form, and about 20% of the degenerative form. After injection of avian type bacilli No. 13 and after BCG the percentage of active and normal forms present was about 40 and that of the degenerative form about 20. After injection of the Timothy grass bacillus there was no active form present, while the normal and degenerative forms were about 80% and 20% respectively. Histiocytes which phagocytosed the strains stained previously by Ziehl's stain had a pH of 6·4–6·8; in other words no difference was observed among the strains. After injection of old tuberculin, the pH of the histiocytes was 6·4–7·4 indicating the presence of normal and degenerative histiocytes. No difference among the types was observed.—R. ALLCROFT.

LEVINE, B. S. (1939). **The Unity of the Haemolytic, Dermonecrotic and Lethal Properties of Staphylococcal Exotoxin and of their Corresponding Counterparts in Staphylococcal Antitoxin.**—*J. Path. Bact.* **48.** 291–298. 3 tables, 1 chart. [Numerous refs.]

In recent years study of the haemolytic, dermo-necrotic and lethal properties of staphylococcal exotoxins had led to contradictory conclusions concerning their relation to one another. L. finds that titration of α staphylococcal antitoxin for antihaemolytic (rabbit cell) anti-necrotic (g. pig skin) and anti-lethal (mouse test) activity gives results which are practically identical. He shows first that 1 unit of U.S. standard toxin exactly neutralizes the haemolytic, dermo-necrotic, and lethal properties of 0·00192 g. of a particular dry toxin. Secondly, that the average ratio of the antibodies for these three properties in a series of ten commercial antitoxins tested against widely varying toxins, was 1·0 : 0·99 : 0·99. Finally, that absorption of a toxin with rabbit cells removes the lytic, necrotic, and lethal properties proportionately, evidence being adduced to show that the reaction between a toxin and rabbit erythrocytes is an adsorption phenomenon and that there is no specific nor separate adsorption of any one of the three factors under consideration. In short, he concludes that α staphylotoxin is toxigenically and antigenically a single substance responsible for a wide range of destructive effects on mammalian cells and that the power of a serum to prevent skin necrosis in g. pigs or "acute death" in mice can be determined from its anti-haemolytic titre for rabbit red cells.—A. W. STABLEFORTH.

I. DURAN-REYNALS, F. (1938). **Studies on a Certain Spreading Factor Existing in Bacteria and its Significance for Bacterial Invasiveness.**—*J. exp. Med.* **58.** 161–181. 4 text-figs., 6 figs. on 3 plates, 7 tables. [Numerous refs.]

II. DURAN-REYNALS, F. (1938). **Further Studies on the Influence of Testicle Extract upon the Effect of Toxins, Bacteria, and Viruses, and on the Shwartzman and Arthus Phenomena.**—*Ibid.* 451–464. 5 tables. [5 refs.]

III. BOYLAND, E., & MCCLEAN, D. (1935). **A Factor in Malignant Tissues which Increases the Permeability of the Dermis.**—*J. Path. Bact.* **41.** 553–565. 5 tables. [8 refs.]

IV. CHRISTENSEN, J. F. (1938). **Kallikrein**

as a Reynals Factor.—*Nature, Lond.* **142.** 36–37. [5 refs.]

V. Duran-Reynals, F. (1939). **A General Permeability-Increasing Effect of a Factor from Mammalian Testicle on Blood Capillaries.**—*Yale J. Biol. Med.* **11.** 601–612. 2 tables. [16 refs.]

VI. Chain, E., & Duthie, E. S. (1939). **A Mucolytic Enzyme in Testis Extracts.** —*Nature, Lond.* **144.** 977–978. 1 table. [8 refs.]

VII. Favilli, G. (1940). **Mucolytic Effect of Natural and Artificial Spreading Factors. Mucolytic Effect of Several Diffusing Agents and of a Diazotized Compound.**—*Ibid.* **145.** 866–867. [10 refs.]

VIII. McClean, D., & Hale, C. W. (1940). **Mucolytic Effect of Natural and Artificial Spreading Factors. Mucinase and Tissue Permeability.**—*Ibid.* 867–868. [13 refs.]

I. Earlier work by the author showed that an extractable factor exists in certain animal tissues, notably the testicle, which has the property of enhancing the invasiveness of certain pathogenic agents by increasing tissue permeability [see also *V. B.* **2.** 529]. The invasiveness of an organism may depend on the existence in it of some factor which renders the tissue more permeable. From investigations carried out mainly on staphylococci, using strains of widely different virulence, and on 14 different strains of streptococci, it is concluded that the invasion of the skin by staphylococci and streptococci depends on the presence in the micro-organism of a substance which markedly increases the permeability of the tissue and enhances the infections produced by these organisms, and by other bacteria, as well as by vaccine virus. It was demonstrated that the non-invasive strains of the same species of *Staphylococcus* and *Streptococcus* do not contain this factor. The passage of the spreading factor into the circulation from local infections was demonstrated. The general increase in tissue permeability thus brought about may enhance local infections elsewhere and open up the tissues to another potentially more dangerous infective agent. This factor from bacteria elicits a similar reaction to the spreading factor extracted from many animal tissues, especially from testicle.

II. Experiments are recorded which show that the lesions produced in the normal rabbit by bacterial toxin and foreign sera, as well as those produced by the Schwartzman and Arthus phenomena, are spread over a much larger area than would normally be the case if the agents are injected with testicle extract. This spreading of the lesions results in a considerable diminution in their intensity when compared with controls without testicle extract; thus what has been gained in size has been lost in intensity. Similarly, lesions produced by invasive strains of staphylococci at high dilutions, or non-invasive strains at moderate dilutions, are definitely lessened in severity or even suppressed by the spreading action of testicle extract. The spreading of the infectious agent through a large area did not have the same modifying effect on vaccine virus since virus lesions were consistently enhanced by the spreading factor from either testicle or an invasive strain of staphylococcus, regardless of the dilution.

III. An investigation was undertaken to determine whether rapidly growing transplantable animal tumours resembled invasive bacteria in the production of significantly large amounts of the diffusing factor [see I]. It was found that aqueous extracts of rapidly growing grafted mammalian tumours did contain a factor which increased the permeability of the dermis of rabbits. Summarized data are given in which normal and malignant tissues are classified according to the amount of diffusing factor they contain. It was shown that the amount of diffusing factor present was approximately proportional to the rate of growth of the tumour, so that the more vigorously growing tumours yielded much greater amounts of the factor than did any normal tissue except mammalian testis. Extracts of the rapidly growing fowl sarcoma no. 1 did not increase diffusion in the dermis, whereas extracts of the Fujinami myxosarcoma produced a diffusion comparable with that caused by the more vigorous mammalian tumours. It was found that fowl testis is deficient in the diffusing factor and that pigeon and drake testes are less active than the corresponding mammalian organs, and it is suggested that the inactivity of extracts from the fowl sarcoma may be related to the poor yield of diffusing factor obtained from fowl testis.

It is pointed out that extracts of rapidly dividing cells such as those of the testis, contain a factor having a similar physiological action in the tissues to that produced by extracts of rapidly growing malignant tumours and culture

filtrates of invasive strains of bacteria: the significance of this is discussed.

IV. C. has recently found that the spreading or diffusing factors are present in human urine, as well as in various tissues and certain anaerobic bacteria as already described by DURAN-REYNALS, CLAUDE [*V. B.* **8.** 286.], McCLEAN [*V. B.* **7.** 289.], and McCLEAN & BOYLAND. In searching for the substance in urine responsible for the spreading effect, it was found that kallikrein, the non-dialysable, vaso-dilator principle from pancreas and urine, was as active, or even more active than the diffusing factor from testis.

V. Experiments are reported which show that when testicle extract is injected intravenously with solutions of T.1824 (an azo dye) or Congo red, the speed of passage of the dye from the circulation to the tissues is greatly increased when compared with the discoloration of the tissues produced by injection of the dye alone. The central nervous system which is not stained by these two dyes alone, remained impervious to them when they were injected together with testicle extract, but when the dye injected was Bismark brown, the passage of the dye from the blood to the C.N.S. was markedly increased when used with testicle extract. It is suggested that the spreading factor present in the testicle extract is responsible for increasing the permeability of the blood vessels.

VI. Histological evidence of the existence in the skin of a mucin-like inter-fibrillar substance led the authors to investigate the possibility of the enzymatic action of testicular extracts of the spreading factor on mucins of different origin. It was found that the extracts had a remarkable action on synovial fluid, reducing its viscosity to approximately that of water when incubated at 37°C. for 30 min. The effect was due to the action of an enzyme on a polysaccharide in the synovial fluid and since the enzyme brings about the disappearance of the most characteristic property of synovial mucin, it can be called a mucinase. Testicular mucinase was found to act also on a polysaccharide present in vitreous humor.

The authors think that it is probable that mucinase and the spreading factor are identical, as their properties are identical, and because the occurrence of spreading factor in bacterial filtrates has so far been found to parallel their mucinase content.

VII. As it has been suggested [see VI] that the diffusing and mucolytic activities of testicular extract may be due to the same factor, the mucolytic effect of diffusing factors from other sources was investigated. It was found that aqueous leech extracts and the venoms from six species of snakes all possessed marked mucolytic activity when added to bovine synovial fluid in the proportion of 1 : 10 vols. and incubated at 38°C. The mucolytic activity was almost completely suppressed when the venom solution was heated for 30 min. at 70°C. before adding it to the synovial fluid, and was completely suppressed by the addition of specific antiserum to the venom; addition of normal horse serum had no inhibitory action. The pH appeared to have a great influence on the activity. It was observed that testis extract and snake venoms are most active at about pH 5·0; the activity gradually decreases and is practically inhibited at pH 8·5. No mucolytic effect could be detected with kallikrein [see IV above and II in group below].

Investigation of the mucolytic activity of an azoprotein, an artificial substance possessing diffusing properties, showed that it exhibited similar activity although the mucolytic effect of the naturally occurring diffusing factors is much more rapid than that of the artificial azoprotein. These results support the hypothesis that the action on tissue permeability may be due to enzyme activity on the mucin-like inter-fibrillar substance. Whether the chemical action of diffusing factors on mucin, as measured by the liberation of reducing substances, is identical, whatever the source of the factor, has not been decided.

VIII. The results obtained in VI are confirmed and it was found that purified preparations of the diffusing factor from *Clostridium welchii* and *Cl. septicum* as well as filtrates from a toxigenic strain of staphylococcus and from a virulent type I pneumococcus, possessed marked mucolytic activity. All these organisms produce immediate diffusion in the dermis. Filtrates from a virulent strain of *Salmonella typhi*, from *Cl. tetani* and from *Corynebacterium diphtheriae* which produce no diffusion contained no mucinase.

As viper venom contains the diffusing factor and also promotes the coagulation of haemophilic blood, and as the chemical constitution of heparin is closely allied to that of mucopolysaccharide, the possible destructive effect on heparin of venom and the mucinases from testis was investigated. None of these sub-

stances was found to have any direct action on heparin. The observations on the influence of pH in VII are confirmed and extended.

The mucolytic activity of the bacterial enzymes is completely inhibited by appropriate antisera but this neutralization is strictly specific.

Although these enzymes cause an immediate fall in the viscosity of the substrate, no reducing substance can be detected for some hours. This time lag between the two reactions suggests that two separate mechanisms may be involved.

Confirmation is reported of FAVILLI's observation [see VII] that diazotized compounds reduce the viscosity of mucin.

The diffusing and mucolytic activities of ascorbic acid were examined and it was found that it possessed diffusing properties and mucolytic activity similar to those of diazotized compounds, *i.e.*, the increase in diffusion is not apparent in the first few minutes but develops during a period of three hours.—R. A.

I, II & III. MADINAVEITIA, J. (1938–39). **Studies on Diffusing Factors. I. Active Preparations from Mammalian Testicle and their Biological Assay. II. Comparison of Diffusing Factors from Different Sources and Preparation of Concentrates from Bull Testicle. III.**—*Biochem. J.* **32.** 1806–1813; **33.** 347–356 and 1470–1477. 16 figs., 6 tables. [Numerous refs.]

IV. EVANS, M. G., & MADINAVEITIA, J. (1940). **Studies on Diffusing Factors. IV. The Mode of Action of Diffusing Factors.**—*Ibid.* **34.** 613–620. 7 figs. [8 refs.]

V. MADINAVEITIA, J. (1940). **Studies on Diffusing Factors. V. Separation of the Diffusing Factor from the Proteolytic Enzymes Present in Culture Filtrates of** *Clostridium welchii.*—*Ibid.* 621–624. 8 tables. [3 refs.]

VI. MADINAVEITIA, J., & QUIBELL, T. H. H. (1940). **Studies on Diffusing Factors. VI. The Action of Testicular Extracts on the Viscosity of Vitreous Humour Preparations.**—*Ibid.* 625–631. 3 figs., 2 tables. [8 refs.]

I. The disadvantages are discussed of assaying preparations of diffusing factor by the use of a standard dose of diphtheria toxin or the use of indian ink as an indicator. A new procedure is described in which haemoglobin is used as an indicator. It possesses a large measure of the properties of an ideal indicator which should be a soluble colouring matter not too quickly absorbed by the skin tissues, which should spread uniformly but not excessively, and should not disappear from the skin too quickly. The use of haemoglobin enables successive tenfold dilutions of diffusing factor to be differentiated with certainty. An improved method for concentrating the diffusing factor is described. From highly active preparations *meso*-inositol has been isolated but neither this substance nor its phosphate, phytin, showed any diffusing properties in biological tests. The activity of purified concentrates of diffusing factor was found to be rapidly destroyed at temperatures above 37°C. and at pH below 4 or above 10.

II. It was stated by CHRISTENSEN [see IV in group above] that kallikrein is a diffusing factor similar to that found in mammalian testicle, but although the final result as regards the spread of haemoglobin is identical in both cases, M. has shown that the effect caused by intracutaneous injection of the two substances is different. From this it appears that the testicular diffusing factor and kallikrein are not identical in their biological action.

Comparison of rattlesnake venom, filtrates of *Clostridium welchii* and *Cl. septicum*, staphylococcal toxoid, leech extracts, and diazobenzenesulphonic acid-serum globulin, showed that they all resemble the testicular diffusing factor.

A method of purification of the testicular diffusing factor is described and the evidence indicates that the active material has protein properties and that its biological action which does not depend on circulation, is not due to a surface tension effect.

III. It has been shown that crude rattlesnake venom contains a factor similar to testicular diffusing factor, but about one hour after injection a difference may be observed between the two; the rate at which the area of spread increases becomes extremely slow in the case of testicular diffusing factor while it is still relatively rapid with the rattlesnake venom indicating that another substance is present in the venom causing a secondary spreading effect manifested by a slow spread of indicators through the skin. Immunization of rabbits against the venom suppresses only the secondary spreading effect so that the animals respond only to the diffusing factor.

Intracutaneous injection of crotoxin, the

neurotoxic constituent of rattlesnake venom, did not show the characteristic spreading properties of diffusing factors although it caused a slow spread of indicators through the skin. It appears therefore that crotoxin and the diffusing factor in rattlesnake venom are distinct from each other.

It is shown that the diffusing factors from both testicle and *Clostridium welchii* are quantitatively adsorbed by alumina Cγ from which they can be conveniently eluted. The similar behaviour of these factors suggested that they are closely related or even identical proteins.

IV. The kinetics governing the mode of action of the diffusing factors are discussed. It has been shown by McClean (1930) that in the action of diffusing factors, the spread takes place only in the true dermis and M. has demonstrated [see II] that the action is independent of circulation. It is now suggested that a rapid reaction occurs between the diffusing factor molecules and the non-permeable dermal layer, accompanied by a much slower reaction between the diffusing factor molecules and the wall of dermal tissue which has already been made permeable.

V. Further evidence is presented indicating that the diffusing factor is not a proteolytic enzyme. Methods are described for separating the proteases and the diffusing factor present in *Clostridium welchii*, and from the results it is concluded that the diffusing factor of *Cl. welchii* is quite distinct from the gelatin-splitting enzymes produced by this organism.

VI. It has been shown [see VI in group above] that testicular extracts contain an enzyme capable of hydrolysing the mucins of synovial fluid and of vitreous humour and it was thought that mucinase and the diffusing factor may be identical. In order to elucidate further this statement a viscosimetric method of assay has been worked out whereby testicular mucinase may be estimated. In the preliminary concentration of the enzyme, mucinase activity seems to run roughly parallel with diffusing activity. So far no definite evidence has been obtained that the mucinase and diffusing factor are identical.—R. Allcroft.

DISEASES, GENERAL

Larrat, R. (1939). Prevention technique. I.—Hygiene et remèdes preventifs. **[Native Methods of Preventing Animal Diseases]**.—*Bull. Serv. zootech. Epiz. A.O.F.* **2.** No. 4. 45–48.

L. has here collected numerous notes on methods used by the natives of French Sudan, Niger and Mauritania for the prevention, treatment and control of livestock diseases, but there is no indication that these methods are of any real value.

Salt grazings are used periodically and are said to cause a great improvement in health. Attempts are made to immunize cattle against bovine contagious pleuro-pneumonia, rinderpest, foot and mouth disease, sheep pox, contagious ecthyma, pleuro-pneumonia of goats and bovine pasteurellosis by the natural disease tissue or exudate prepared and administered in a variety of ways.

Many plants are also used to cure various diseases.—J. E.

Pirani, A. (1938). Ambiente zootecnico del Harar: profilassi generale e miglioramente del bestiame in A.O.I. **[Stock Improvement and Disease Control in the Harar Area of Abyssinia]**.—*Profilassi.* **11.** 16–25. 4 figs., 1 table, 1 graph, 1 map.

A description is given of the climatic, geographical and pastoral conditions in the area, and of the types of native stock and their economic value. Rinderpest, bovine contagious pleuro-pneumonia, anthrax and blackleg have been encountered in cattle, but P. was unable to locate any disease due to trypanosomes or piroplasms, although he thinks they may exist. Strangles and sarcoptic mange have been met with in horses, but not horse sickness or piroplasmosis.

A disease similar to infectious pleuro-pneumonia has been described in sheep and goats, and trypanosomiasis is prevalent in camels. Rabies occurs in dogs.

It is suggested that the stock of the area should be developed to supply meat, wool, and leather for Italy. It is considered that the only disease which would be difficult to control is rinderpest, but this would have to be dealt with, or the transport of meat to Italy might lead to the introduction of the disease. Sufficient veterinary staff and equipment would have to be provided to deal with this disease by modern methods.

For the production of high quality meat, nuclei of imported cattle should be established, and artificial insemination used for rapid dissemination of the imported blood. Karakul sheep, which have done well in Eritrea, should be established, and attempts should be made to establish breeds of wooled sheep.—U. F. R.

GUYSELMAN, P. C. (1940). **Controlling Diseases and Parasites in Garbage-Fed Hogs.**—*J. Amer. vet. med. Ass.* **96.** 18–23.

A discussion of experiences in California and Colorado, much of which is based on G.'s attendance over 15 years at the largest pig farm in the world. This establishment, at Fontana, Calif., carries 60,000 head of home-bred pigs, and much of its food supply consists of 400 tons a day of swill (kitchen waste, brock, or " garbage ") from Los Angeles. The animals have been running over the same ground since the farm was opened in 1921.

Swine fever has been the major disease encountered on this farm, and the fluctuations in the success which has attended routine vaccination are discussed. G. considers that the method and rapidity of transport from place of production to the farm is of the greatest importance in ensuring the potency of the virus used in the vaccine. Great success has resulted from the use of virus packed with CO_2 ice in an insulated container and delivered rapidly.

Foot and mouth disease and vesicular exanthema have both appeared on the farm in question. The other conditions which have proved at all serious include a bronchitis of unweaned pigs which made its appearance in 1926, persistently affected from 30–40% of susceptible animals despite many forms of treatment, and disappeared spontaneously after less than two years. Outbreaks of disease characterized by pneumonia or enteritis are encountered at intervals, and are usually associated with inadequate sanitation. Anaemia is combated by throwing earth into teh farrowing pen every 2–3 days.

G. considers that the importance of swill-fed pigs as a source of human trichinosis has been exaggerated, and that pigs fed household scraps on small holdings are equally responsible. He is of the opinion that cooking seriously reduces the feeding value of swill, most of the piglets so fed being " runts " [an opinion which will find little support at the present time in Great Britain, where large numbers of pigs are being maintained on cooked swill under municipal pig schemes.—ED.]. He urges that cooking of waste before feeding to pigs shall not be enforced in the U.S.A., in order that " an industry may not be jeopardized." [The far more serious consequences of " jeopardizing " public health do not seem to receive the attention they deserve. Furthermore, G.'s claims that swill keeps down lice and acts as a vermifuge do not appear to have been tested scientifically.—ED.]—ALASTAIR N. WORDEN.

I. BRYANT, J. B. (1940). **Swine Enteritis in Veterinary Practice.**—*Proc. 43rd ann. Meet. U. S. Live Stk sanit. Ass. 1939.* pp. 231–242. [3 refs.]

II. DOYLE, L. P. (1940). **Infectious Types of Swine Enteritis.**—*Ibid.* pp. 224–231.

I. The experiences of an Iowa practitioner. Pig farmers who have a high incidence of scours among their very young piglets are those who subsequently encounter enteritis in their weanling and fattening stock, and B. suggests that the conditions are connected. Necrotic enteritis of newly weaned pigs is of very frequent occurrence in animals to which ground oats are fed, and it is recommended that oats should be fed whole until the pigs are about 100 lb. in weight. A very disheartening feature of necrotic enteritis is its occurrence during serum-virus vaccination against swine fever, at which time large numbers of apparently healthy animals may suddenly develop the disease. Swine dysentery made its appearance in Iowa also in 1918, and is now responsible for severe losses.

In conclusion it is claimed that the clean-ground method for swine production is the greatest single factor in the successful control of enteric diseases of swine, and that if proper nutrition and sane methods of production and management are also enforced, swine enteritis may be practically eradicated.

II. A discussion of the investigation of naturally-occurring outbreaks and the experimental work carried out by the staff of the Indiana Agricultural Experiment Station. D. considers it doubtful whether *Salmonella suipestifer* is responsible for " a self-perpetuating disease in hogs which are immune to cholera [swine fever] and free from dysentery ", although he states that all strains of the organism which have been fed to pigs have set up some degree of enteritis. *Fusiformis necrophorus* has been isolated repeatedly from the intestinal walls of diseased animals, but although characteristically pathogenic for

rabbits such strains appear harmless when tested on healthy pigs.

The disease termed swine dysentery, and known to the farming community as " bloody diarrhoea " or as " bloody or black scours ", has been responsible for great losses in Indiana since its first recognition in 1918. It may attack swine of all ages, although it is more severe in younger stock. The colon is invariably and the stomach frequently affected, whereas the small intestine remains normal. There is a sharp demarcation of healthy from diseased tissue at the ileo-caecal junction. It is possible to set up the disease in healthy pigs by feeding either the colon or the faeces of affected animals, but not by feeding other viscera, even though these may contain large numbers of *S. suipestifer*. The experimental incubation period is from 4–12 days, while that of natural outbreaks may be much longer.

Very few important outbreaks of swine enteritis have been traced to coccidiosis.

—ALASTAIR N. WORDEN.

RIVADELO, T. F. (1939). **Important Diseases of Swine and Their Control.**—*Philipp. J. anim. Indust.* **6.** 487–499.

At the present time there are few large-scale pig producers in the Philippines, although in the rural districts almost every family raises a few pigs. R. suggests that within the next few years there may be a considerable development of the commercial pig industry.

Swine fever is prevalent all over the islands, and R. discusses its epizoology in lay terms. Localized lesions of tuberculosis are commonly found at slaughter, and in some cases at least are believed to be due to the human type of organism. Brucellosis is probably widespread, although its presence has been verified only recently. As yet there do not appear to have been any serious outbreaks of scours in young animals. Rather less than 1% of all pigs at the public abattoir in Manila are infected with cysticercosis. Kidney worm disease [presumably due to *Stephanurus dentatus*] is widespread.—ALASTAIR N. WORDEN.

POCKLEY, L. A. (1939). **A Veterinarian on a Sheep Stud. III.**—*Aust. vet. J.* **15.** 176–178.

The condition known as " sanding " in sheep is described. This occurs usually after prolonged periods of drought and artificial feeding and up to 8% of a mob may be affected. It is due to the ingestion of large quantities of dust and sand with the supplementary feed (especially with the smaller cereal grains). This may collect in the caecum in large quantities, and the faeces often consist of 60% by volume of fine dust or sand.

Treatment consists in free access to water and suitable bulky fodder (hay or straw), and the inducement of gentle purgation with magnesium sulphate varying from 1·5–2 oz. according to the condition of the sheep.

Prophylaxis consists in varying the system of feeding to provide bulky roughage such as wheat or oaten straw or hay.—H. B. CARTER.

FRASER, A. C. (1940). **Lactation Tetany and the Anaerobes.**—*Vet. Rec.* **52.** 588–589. [2 refs.]

F. considers that " lactation tetany " as met with in Lincolnshire may be regarded as falling into Turner's group of braxy-like diseases caused by specific anaerobes, that the observed hypomagnesaemia may not be causal but merely incidental to disturbed metabolism, and that the possibility of vaccine prophylaxis should be considered.

[This view is not in line with observations of investigators either in this country or in Holland, and in F.'s own cases the presence of anaerobes in muscle lesions was not correlated with magnesium content of blood.]—H. H. G.

DONATIEN, A., & LESTOQUARD, F. (1940). Recherches expérimentales sur le typhus du porc. (Résistance du virus, immunité, immunisation). [**" Pig Typhus ". (Resistance of the Virus, Immunity, and Immunization)**].—*Bull. Acad. vét. Fr.* **13.** 58–59. [1 ref.]

The authors report that a pig which recovered from an attack of " pig typhus " [see *V. B.* **10.** 691.], showed no immunity when tested four months later, that its blood did not convey the disease to another pig, and that these two pigs and a normal pig could be infected by means of blood which had been stored for 89 days at –12°C.

They report also that three pigs were not infected by 10, 50, and 100 c.c. respectively of spleen suspension which had been placed in contact with 3 per thousand formaldehyde for six days at 37°C., and that these three pigs showed no immunity when tested 25 days later together with a control, all dying within three days with typical symptoms of " pig typhus ".

—A. W. STABLEFORTH.

BELTRAMI, B. (1940). Febbre catarrale maligna e malattia di Borna. Rapporti epidemiologici e osservazioni personali

nella zone Casalasca (basso Cremonese). [**Bovine Malignant Catarrh and Borna Disease**].—*Profilassi.* **13.** 6–14. [Numerous refs.] [German summary].

A general review of the two conditions, with clinical records of cases in the area studied. B. considers that the borderline between the causal agents of Borna disease, equine encephalomyelitis, and bovine malignant catarrh is not sharp enough to allow them to be regarded as distinct viruses. The occurrence of nervous symptoms in the naso-ocular form of bovine malignant catarrh is referred to and it is stated that nerve lesions in rabbits experimentally infected are histologically similar to those found in rabbits affected with Borna disease. Epidemiological observations are advanced in support of the identity of the viruses. Both the bovine and the equine diseases can be transmitted to sheep, but in some cases the spread of malignant catarrh can be explained only on the assumption that both horses and sheep are involved.—J. B. Brooksby.

Rafael, S. (1939). A encéfalo-mielite enzoótica nos equinos do concelho de Santarém. [**Equine Encephalomyelitis at Santarém, Portugal**].—*Rev. Med. vet., Lisboa.* **34.** 126–131.

R. describes an outbreak of E.E. at Santarém. Most of the animals attacked were mares and no other species of animal was affected. The commonest symptom was posterior paresis, with involuntary urination, staggering gait and dragging of feet. Some animals also showed anterior paresis and most animals were very excitable and easily frightened. There was lack of control of the upper lip and head generally. In most cases the temperature was normal. P. treated both affected and unaffected but in-contact animals with urotropine and claims to have had notable success. [This drug has often been advocated on erroneous grounds for the treatment of encephalitis. It is presumed that those responsible for this idea were under the impression that formaldehyde is set free in the affected tissue in the same way as it is in the urinary system. The absence of an acid reaction in the tissues of the central nervous system prevents such action.]

In another outbreak the disease was of the hyperacute type and death was so sudden that E.E. was not suspected for some time.

Autopsy of hyperacute cases revealed cerebral congestion and focal haemorrhages.—M. W.

Innes, J. R. M., & Shearer, G. D. (1940). **"Swayback": A Demyelinating Disease of Lambs with Affinities to Schilder's Encephalitis in Man.**—*J. comp. Path.* **53.** 1–41. 37 figs. on 7 plates, 5 tables, and 1 graph. [Numerous refs.]

"Swayback" has been dealt with by Innes in earlier papers [*V. B.* **6.** 607, and **7.** 131]. This is a fuller account in which more recent work on aetiology is recorded.

It is a non-febrile disease of new-born and young lambs, having a wide distribution in Great Britain and being known to occur in Australia, New Zealand, and other countries. It takes the form of a spastic paralysis of the limbs, particularly the hind limbs, accompanied sometimes by blindness. In all but the mildest cases, the course is progressive, with death in a few days to a few weeks from bronchopneumonia, some other infection or marasmus. Mild cases may not be detected for some weeks: these show a slight unsteadiness in gait, followed by recovery, and in later life they may give birth to normal lambs.

Pathological changes are confined to the central nervous system, the essential lesion being bilateral destruction of the cerebral white matter which is replaced by a loosely woven, greyish, gelatinous substance, or is completely liquefied with the production of cavities. Secondary degeneration of the motor path follows. Microscopically demyelination is constant and is probably the primary lesion.

The disease is ante-natal in origin and is regarded as a true degeneration with some resemblance to Schilder's disease in man. Micro-organisms are not concerned in its aetiology. It is neither hereditary nor a developmental abnormality.

The suggestion is made that "swayback" may be due to a disturbance of Cu metabolism, although not to Cu deficiency *per se*, as pasture analyses show no deficiency of this element. Feeding of copper supplements to pregnant ewes has been found to be an effective preventative [see also *V. B.* **11.** 243].

The authors are unable to confirm the claim of Bennetts and Chapman [*V. B.* **8.** 654.] that Cu deficiency induces in pregnant ewes a macrocytic hyperchromic anaemia comparable to pernicious anaemia in man and that in consequence their lambs are affected with "swayback".

Lead appears to play a part, as yet undetermined, in the development of the disease.

—J. W. Whittick

SCHLOTTHAUER, C. F. (1940). **The Incidence and Pathology of Various Lesions of the Nervous System.**—*N. Amer. Vet.* **21.** 551–553. [14 refs.]

Brief mention is made of various diseases affecting the nervous system in animals. Rabies still presents a problem in parts of America. S. considers that preventive vaccination should be encouraged as its value has been proved in countries where its use has been made compulsory.—A. T. PHILLIPSON.

HOFLUND, S. (1940). Untersuchungen über Störungen in den Funktionen der Wiederkäuermagen, verursacht durch Schädigungen des N. vagus. [**Research on Functional Disorders of the Ruminant Stomach, due to Injury to the Vagus Nerve**].—*Svensk VetTidskr.* **45.** Suppl. No. 15. pp. 322. 22 text figs., 28 figs. on 25 plates, 89 tables. [Numerous refs.] [In German : English summary].

This is the fully detailed doctorate thesis of experimental and clinical work already described in brief elsewhere [*V. B.* **10.** 854]. It is not further abstractable and should be studied by those actively interested in ruminant physiology.—J. E.

DOUGHERTY, R. W. (1940). **Physiological Studies of Induced and Natural Bloat in Dairy Cattle.**—*J. Amer. vet. med. Ass.* **96.** 43–46. 2 tables. [6 refs.]

Experiments were made (a) to find if gases can be absorbed from the rumen, (b) to find the effect of increased intra-ruminal pressure, and (c) to find the effect of the individual rumen gases on sheep and cows.

In experiments on sheep an increase in carbon dioxide was demonstrated in the portal blood after the rumen had been insufflated with the gas, indicating that absorption had taken place. Increase in intra-ruminal pressure was induced in cows with rumen fistulas with carbon dioxide, methane, hydrogen, and air. The symptoms produced were increase in respirations (Cheyne-Stoke respirations occurred with CO_2 insufflation) and a slight decrease in rumen contractions. These were most marked with carbon dioxide and were slight with the other gases. Mixtures of carbon dioxide and methane produced the carbon dioxide degree of symptoms. It was not easy to maintain the pressure as gas was rapidly eructed. Experiments in sheep showed a rise in blood pressure and increased heart rate with an increase in rumen pressure.

The presence of carbon monoxide in the rumen gases of animals affected with bloat was demonstrated. Insufflation of the rumen of fistula cows with this gas produced extreme symptoms and prostration. (The exhaust fumes of a car were used.) The rumen movements were inhibited and no eructation of gas occurred. Concentrations of 0·15–7·4% were experimentally produced for carbon monoxide in the rumen and 35–80% in the blood. The symptoms varied with the concentration. Increasing the pressure with normal rumen gases produced a more rapid absorption of the carbon monoxide, and the symptoms produced were remarkably similar to those of naturally occurring bloat.—A. T. PHILLIPSON.

ROWLANDS, W. T. (1940). **"Pining" in Lambs on Permanent Pasture in N. Wales. The Influence of Intestinal Nematodes upon the Causation of this Condition.**—*Vet. Rec.* **52.** 508–512. 4 tables. [7 refs.]

R. describes investigations during July to October of the years 1935–39 inclusive with lambs kept on two 3-acre plots of unmanured permanent pasture (4 per acre) and upon two 4-acre plots of temporary pasture containing wild white clover (5 per acre), each plot also carrying one bovine. Each lamb was weighed every three weeks, and total worm counts were made at slaughter. A tabulation of results showed that there was greater average live weight gain on the temporary plots. No great difference, except during 1939, occurred in the average worm burdens of the animals on the various plots and these bore no consistent relationship to the live weight increments. The records of individual lambs on the same plot emphasized the difficulty of drawing conclusions from averages. From 1937 a differential worm count was made.

R. concludes that "pining" is not due to parasitism alone, but that parasitism and nutritional factors must be considered. Dosing of half the lambs on the two plots with a copper sulphate : nicotine sulphate mixture did not materially lessen the worm burdens, but live weight increases in the dosed lambs were considerable. This improvement may have been due to correction of a copper deficiency. [More than one nutritional factor may be involved, *e.g.* cobalt. The effectiveness of the crude 40% nicotine sulphate usually recommended for dosage (Black Leaf "40") as compared with pure nicotine sulphate may

be due to a factor as yet undetermined.]
—C. V. WATKINS.

KOSTNER, M. (1939). Zur Aetiologie der Pyometra des Rindes. **[Aetiology of Pyometra in Cattle]**.—*Wien. tierärztl. Mschr.* **26.** 225–237 and 257–271. 7 figs., 3 tables. [Numerous refs.]

K. maintains that pyometra in cattle arises primarily from physiological rather than from pathological reactions.

If from any cause the foetus dies when uterine activity is under the full control of the corpus luteum, which, K. asserts, is between the sixth week and the seventh month of pregnancy, the control is still maintained by that body, the uterine wall remains turgid and relaxed, and the uterine cervical plug persists. The dead foetus, however, acting as a foreign body, stimulates cell activity, leucocytic infiltration and more intense local hyperaemia, which results in the production and accumulation of sterile pus and absorption of the foetus. That condition persists until the weight of the pent-up material forces the cervical plug and allows the escape of a certain quantity of pus and the entrance into the uterus of micro-organisms; it ceases when endocrine control would normally pass to the placenta. If the foetus dies before the control of the corpus luteum has fully developed it is expelled and the normal sexual cycle recommences.

The results of clinical observations, of cytological and bacteriological examination of the pus, of histological study of uteri and ovaries and attempts to transmit the disease are offered in support of the hypothesis.—G. WILLIAMSON.

I. LUCAS, J. (1939). Contribution à l'étude de la toxicité du sérum bovin. Rôle de l'action combinée du formol et de la chaleur sur cette toxicité. **[Combined Action of Formalin and Heat on the Toxicity of Bovine Serum]**.—*Thesis, Alfort.* pp. 91. [Numerous refs.]

II. SCHEUER, G. (1939). Étude de la toxicité du sérum de chien. Action des agents physico-chimique sur cette toxicité. **[Action of Physico-Chemical Agents on the Toxicity of Dog Serum]**. —*Thesis, Alfort.* pp. 73. [Num. refs.]

I. L. has studied the toxicity of bovine serum for the g. pig. This toxicity is of a high order; a dose of 10 c.c. subcutaneously causes sleepiness and trembling within 30 min., death follows in several days, and there is necrosis at the site of inoculation. 0·1 c.c. given intradermally causes a haemorrhagic and oedematous lesion, intravenous inoculation of 3 c.c. is followed by death in about 5 min., and a dose of 10 c.c. causes immediate death. With larger doses the results are the same with the intraperitoneal route; intramuscular inoculation causes extensive local lesions and death in 15–20 hours. Ageing and heating of bovine serum does not reduce the toxic effects except when it is administered intravenously in very small doses. Treatment with formalin for a sufficient length of time at the right concentration, will detoxify bovine serum so that it is without harmful effect even when inoculated intravenously in large doses. The combined action of heat and formalin allows a lower concentration of formalin to be used for this detoxification. Ageing and heat considerably alter the local toxic effects of bovine serum when it is inoculated subcutaneously.

II. The toxicity of canine serum appears to be of quite a different order from that of bovine serum. In the g. pig the effects may be similar to those caused by bovine serum, but the results are much more irregular and the doses must be considerably higher. The toxic effects of canine serum in rabbits are slight if any. A dose of 0·5 c.c. intravenously is fatal to mice in about 30 min.—D. L. HUGHES.

MORELLI, E., & VERCELLONE, A. (1939). Prime ricerche sulle eritroblastosi aviarie. **[Research on Avian Erythroblastosis]**.—*Biochim. Terap. sper.* **26.** 241–259. 4 figs., 5 tables. [13 refs.] [English, French and German summaries. Abst. from English summary].

Attempts are reported at purification of the chicken erythroblastosis virus by precipitation with ascorbic acid and adsorption with aluminium hydroxide.

Atypical syndromes occurring after injection of a leucaemic protein-free plasma are described.

A case is described of neoformation at the site of inoculation of active material into an immune animal.

Attempts to transmit the disease from chickens to pheasants are also described.

DAWSON, E. K., INNES, J. R. M., & HARVEY, W. F. (1939). **Debatable Tumours in Human and Animal Pathology. VIII. Melanoma.**—*Edinb. med. J.* **46.** 695–711. [Numerous refs.] [For previous parts, see *V. B.* **9.** 727, and **10.** 44].

The benign melanoma of the skin is a complex malformation of antenatal origin resulting from focal malinduction of the epidermis and its appendages. Melanoblasts, the stem cells, and melanocytes, which are considered to be epithelial, are the principal component elements, but dermis, nerves and blood vessels also participate. The "acanthotic naevus" is wholly epidermal.

In benign ocular melanoma, the melanoblasts are again epithelial in origin and type, being derived in this case from neuro-epithelium.

Malignant cutaneous and ocular melanomas are, therefore, carcinomas. The grounds for such views, based on morphological and embryological criteria, are fully dealt with.

Choroidal and meningeal melanotic cell aggregations (in melanosis) are of the mesodermic pigment-cell (chromatophore, of the mesodermalists) type. While definite proof of the occurrence of mesodermic melanomas has still to be established, the authors do not deny the possibility, and suggest that a strict unitary conception of melanoma may have to be abandoned.

[The views expressed here correspond fairly closely with those put forward by DAWSON, J. W. (1925), in his classical monograph].

—J. W. WHITTICK.

HARVEY, W. F., DAWSON, E. K., & INNES, J. R. M. (1940). **Debatable Tumours in Human and Animal Pathology. IX. Endothelioma.**—*Edinb. med. J.* **47.** 513–540. 1 text-fig., 80 figs. on 10 plates. [Numerous refs.] [See also preceding abst.]

This article is the last of the series dealing with "debatable tumours" in man and animals. Almost all the material illustrated in this paper is from human sources.

Endotheliomas are divided into benign (endotheliocytoma) and malignant (endothelioblastoma) types. The former include haemangioma and lymphangioma as well as benign tumours arising from serous and synovial membranes and the meninges. The malignant group is considered to include the reticulum cell sarcoma of lymph nodes. The term "endothelioma" is made to include a greater variety of neoplasms than is commonly grouped here and an effort is made to provide a suitable classification of tumours which have always been difficult to fit into any scheme. Further details can only be appreciated by reference to the original text and illustrations.—E. G. W.

LEVINE, M. (1939). **The Cytology of the Tumor Cell in the Rous Chicken Sarcoma.**—*Amer. J. Cancer.* **36.** 276–302, 386–430 and 581–602; **37.** 69–107. 161 figs. [Numerous refs.]

This is a detailed study of the cytological changes following the injection into young fowls of desiccates of virulent Rous fowl tumours. The desiccated tumour was injected in the form of a saline suspension into the breast or leg muscles of more than 100 Barred Plymouth Rock fowls and tissue was removed for cytological examination at intervals varying from 5 min. to 73 days. Tumour grafts and filtrates were also used. Control fowls were injected with dried muscle powder from healthy fowls. Transformation of cell types was studied by injecting fowls with trypanblue before or after injection of the desiccated tumour.

The earliest reaction (first ten hours) appears to be protective; erythrocytes, pseudo-eosinophile leucocytes, followed by large mononuclear cells, predominate. The first appearance of fibroblast-like cells similar to those of the Rous tumour occurs between the 10th–18th hours. They appear to develop from mononuclear cells, following the conversion of these into transition cells. These fibroblast-like cells are the predominating cells of the Rous tumour and seem to be the malignant cell; in the early stages they rapidly proliferate, overlap, coalesce at points of contact, and form a characteristic network. For further details of this very comprehensive study the original should be consulted.—E. G. WHITE.

MERCIER, L. (1939). Hypothèse sur le mécanisme de la transmission héréditaire d'un caractère de lignée. La notion de facteur plasmo-chromosomique et l'hérédité mendélienne. **[The Mechanism of Hereditary Transmission].**—*Bull. biol.* **73.** 232–247. [Numerous refs.]

The results of breeding experiments carried out by M. indicate that the transmission of lymphosarcomas in mice cannot be explained by the generally accepted chromosome theory of heredity. In an attempt to explain his results M. postulates the interaction of an extra-nuclear cytoplasmic factor with an intra-nuclear chromosome factor. This conception he terms the plasmo-chromosomic factor.—N. J. S.

NUTRITION IN RELATION TO DISEASE

KEHAR, N. D. (1940). **Serum Protein Fractions of Normal and Vitamin A, Calcium and Phosphorus Deficient Cattle.**—*Indian J. vet. Sci.* **10.** 223–228. 5 tables. [17 refs.]

Serum-protein fractions estimated by the method of CAMPBELL & HANNA (1937) are reported for single samples (jugular vein) from six normal cows, one cow and a calf kept on a carotene-low ration, two cows on a low Ca diet, and two cows on a low P diet. The total proteins and the globulin fractions of sera from animals deficient in vitamin A, Ca, and P were reduced considerably below the normal. As antibodies are associated with the serum globulins, K. suggests that the observed reduction in this fraction may explain the increased susceptibility to infection of animals on deficient diets.—W. R. MUIR.

SINCLAIR, R. D. (1939). **The Salt Requirement of Growing Pigs.**—*Sci. Agric.* **20.** 109–119. 1 fig., 6 tables. [2 refs.]

In an attempt to determine the optimal NaCl intake for the growing pig, a series of three experiments was carried out during 1936–38. In all a total of 91 animals was involved, the period in each case being from weaning to bacon weight. A cereal ration which was calculated to supply 0·06 g. NaCl per head daily was found to be inadequate for normal growth; the animals receiving it developed symptoms of salt craving and became unthrifty in appearance. Normal growth and health were obtained when the cereal ration was supplemented by tankage, linseed oil meal, and ground limestone, the calculated daily intake being 1·7 g. per head. The addition of further quantities of NaCl (0·5–3·0% of the ration, giving daily intakes of from 14·6–73 g. NaCl) was without effect upon rate of growth, utilization of food or carcass quality. It is concluded, therefore, that the NaCl requirements of the growing pig are little more than 1 g. per day. From the known chlorine retention of a pig growing at the rate of 1 lb. per day, it may be calculated that the theoretical requirement is 1·33 g. per day. In practice, any ration which is deficient in NaCl would be adequately supplemented by the addition of 0·5%.

Animals which received 3% of added NaCl showed marked thirst and urination, but there was no increase in the moisture content of their muscles, and their dressing percentage and kidney size was unaffected. [This is further evidence that the pig can tolerate a large intake of NaCl.]—ALASTAIR N. WORDEN.

HIXSON, R. W. (1940). **The Curative Effect of Stale Bread in Enteritis of Swine.**—*J. Amer. vet. med. Ass.* **97.** 584–587.

H. traces much of the enteritis which is so prevalent in the cornbelt to the so-called community sales. Pigs are brought in from as far afield as the drought areas of Oklahoma and Texas, and have been fed previously on such poor diets that they are not in a fit condition to withstand either the routine serum-virus vaccination against swine fever or the rich diets which they are given after purchase. Pyrexia and acidosis, followed by the development of enteritis, is said to have been recorded in many thousands of such cases.

As sera, various bacterial derivatives, and drug treatment with alkalis yield unsuccessful results, H. tried the effect of feeding stale wholemeal bread, as a source of B vitamins, and alkalis to affected animals in some 30 herds: controls receiving a grain ration and alkalis were maintained in some cases. Brief notes are given of the results obtained in six of the herds; the treatment was considered to be successful. The routine serum-virus treatment of pigs from the drought areas is condemned as productive of losses which are more serious than those due to swine fever itself.—A. N. W.

HASTINGS, C. C. (1940). **Treatment of So-Called Necrotic Enteritis of Swine with Nicotinic Acid.**—*N. Amer. Vet.* **21.** 724–726. [2 refs.]

Nicotinic acid, in daily doses of from 60–150 mg. per head, was administered on four farms to ailing or unthrifty pigs which were affected with necrotic enteritis or with the condition which is characterized by a profuse dysentery and which is apparently causing severe losses in the U.S.A. [see *V. B.* **11.** 245]. Details of the dietaries prior to the manifestation of ill-health are not given. An outbreak of the dysentery was not influenced, but the recovery rate in the necrotic enteritis outbreaks appeared to be high. As all the affected animals in each herd were treated, there were not any true negative controls, and H. is careful to point out that more field evidence is necessary before the value of nicotinic acid therapy in necrotic enteritis can be assessed.—A. N. WORDEN.

VON EBBELL, H. (1939). Ueber den Kannibalismus bei Legehennen. [**Cannibalism in Laying Hens**].—*Arch. Geflügelk.* **13.** 357–361. [7 refs.] [English summary].

The suggestions regarding the aetiology of the disease made by VAN HEELSBERGEN (1929) and MILLER & BEARSE [*V. B.* **9.** 884.] are reviewed. The recommendations these authors make with a view to stopping or preventing the vice were put into practice in the establishments controlled by the author but all proved unsuccessful. The application of KNOWLES' theory [*Eggs.* **41.** 141. (1939).], that the supply of cereals fed to the birds should be strictly limited, was followed by a spectacular cessation of cannibalism in the flocks where the condition had been rampant for years and where the birds had been receiving an unrestricted grain supply.—G. WILLIAMSON.

EMMEL, M. W. (1940). **The Hematology of Avitaminosis A in Dogs and Rabbits.**—*J. Amer. vet. med. Ass.* **97.** 145–148. 2 charts. [4 refs.]

Differential blood counts were carried out on young vitamin A deficient dogs to determine the diagnostic value of haematological studies in the comparatively early stages of A deficiency. One group of three puppies fed an A deficient diet developed symptoms of acute avitaminosis A in nine weeks, and another group of three maintained on a low vitamin A diet for 18 weeks developed chronic avitaminosis A. The average leucocyte count in both groups during the first three weeks showed an increase of about 8,000 per c.mm. followed by a decrease to its original level. In the acute A deficient group there was another gradual increase to a maximum of about 22,000 when symptoms of deficiency were apparent. Also the average small lymphocyte count gradually decreased while the average large lymphocyte count gradually increased so that the original relationship of small to large lymphocytes became reversed during the period of deficiency. In the chronic A deficient group the average total lymphocyte count showed an increase with a predominance of large lymphocytes.

Deficiency symptoms disappeared and the blood picture returned to normal within four weeks when 37,500 I.U. of vitamin A in shark liver oil was fed every other day to the two groups.

Differential counts made on the blood of five does, eight 7-week-old, and six 1-week-old, rabbits showed that a naturally occurring chronic vitamin A deficiency was present. After daily administration of 7,500 I.U. of vitamin A over a period of seven weeks the blood counts returned to normal. The A deficiency in the 1-week-old rabbits was regarded as being caused by chronic A deficiency in the doe.—R. ALLCROFT.

WOLFANGER, L. (1938). Können verschiedene Vitamin B_1-Mengen den Vitamin A-Bedarf beeinflussen? [**Can Various Amounts of Vitamin B_1 Influence the Vitamin A Requirement?**].—*Inaug. Diss., Leipzig.* pp. 19. [Numerous refs.]

Tests on white rats, which were given adequate to abundant amounts of vitamin B_1 in yeast free from vitamin A, showed that their vitamin A need remained at the same level irrespective of the yeast intake.—J. E.

MACKENZIE, C. G., & MCCOLLUM, E. V. (1940). **The Cure of Nutritional Muscular Dystrophy in the Rabbit by Alpha-Tocopherol and its Effect on Creatine Metabolism.**—*J. Nutrit.* **19.** 345–362. 4 figs. [Numerous refs.]

Young rabbits of both sexes, the normal urinary creatine levels of which were less than 10 mg. per day, developed characteristic symptoms when fed upon a dystrophy-producing diet [see GOETTSCH & PAPPENHEIMER. *J. exp. Med.* **54.** 145. (1931).] supplemented by 10% defatted wheat germ. A marked creatinuria was present some time before the first appearance of physical symptoms, which were accompanied by anorexia and by a marked loss in weight. After about 3–4 days of such symptoms, during which time the average daily creatine excretion had risen to 50–150 mg., an acute dystrophy supervened, terminated in from 1–4 days by death. Throughout the course of the disease, there was no significant change in the creatinine output. Even in acute stages, the disease could be cured by the administration of 0·5–1 c.c. per day of wheat germ oil, and a vitamin E concentrate was also effective. Treatment of wheat germ oil itself and of various fractions with ferric chloride almost abolished the curative properties, but 3–5 mg. doses of α-tocopherol in ethyl laurate cured affected animals which weighed about 1 kg., and in two cases it was found that rather less than 1 mg. per kg. bodyweight of α-tocopherol was a satisfactory prophylactic dose on the diet employed.

It is therefore concluded that nutritional

muscular dystrophy in the rabbit is an uncomplicated vitamin E deficiency, and in view of the fact that the creatinuria accompanying the disease is markedly reduced within 24–48 hours of vitamin E administration, it is suggested that the rabbit may well serve as a test animal for this vitamin.—ALASTAIR N. WORDEN.

BOYLE, P. E., BESSE, O. A., & HOWE, P. R. (1940). **Rate of Dentin Formation in Incisor Teeth of Guinea Pigs on Normal and on Ascorbic Acid-Deficient Diets.**—*Arch. Path.* **30.** 90–107. 8 figs. [Numerous refs.]

The use of alizarin to stain vitally the dentin formed during a particular period has made it possible to measure the marked variations in rate of deposition that occur in different parts of the incisor teeth of animals on adequate diets and to compare them with the rates found in corresponding parts of the teeth of animals on restricted amounts of ascorbic acid. The rate of dentin formation in definite areas near the formative end of the tooth has been found to be uniform in animals given the same supplements of ascorbic acid. After a standard depletion period the amount of dentin deposited in this region has been shown to vary directly with the amount of ascorbic acid administered. The findings demonstrate a measurable quantitative relation between the rates of formation of an intercellular substance, the dentin, and the amount of ascorbic acid administered to guinea pigs. They make possible the development of an objective biologic assay method for the determination of vitamin C.

DAM, H., & GLAVIND, J. (1940). Vitamin E und Kapillarpermeabilität. [**Vitamin E and Permeability of Capillaries**].—*Naturwissenschaften.* **28.** 207. [4 refs.] [Abst. in *Brit. Chem. Physiol. Abstrs.* Sept., 1940. p. 752, copied *verbatim*].

In chicks suffering from alimentary exudative diathesis, the permeability of the capillaries is increased and hence, after intravenous administration of a dye [*e.g.*, trypan-blue), the muscles are much more strongly coloured than are those of healthy chicks or diseased chicks receiving dietary supplements of *dl*-α-tocopheryl acetate. Perceptible exudation usually occurs in fatty tissue only, probably because, in this tissue, mechanical resistance is decreased. The diathesis is accompanied by muscular dystrophy due to absence of vitamin *E* or other factors from the diet. Possibly there is a causal relationship between the dystrophy and the increased permeability of the capillaries.

PUBLIC HEALTH

WAHBY, A. M. (1939). **Milk Production and the Nation's Health.**—*J. Egypt. med. Ass.* **22.** 474–496. [Numerous refs.] [Abst. in *Bull. Hyg., Lond.* **15.** 45, copied *verbatim.* Signed: W. G. SAVAGE].

The paper is a general review of milk problems in relation to health, particularly as regards nutrition and the liability to spread bacterial diseases. As regards Egypt the author advocates the adoption of free and cheap milk schemes for school-children on the lines of the practice in England. Article 4 of the Egyptian Milk Act, recently formulated, forbids the use of milk from animals suffering from an extensive series of diseases. The act also deals with the sanitary condition of cowsheds and dairies and contains regulations forbidding persons suffering, or suspected to be suffering, from certain specified diseases from handling milk or milking animals. It also includes in the forbidden list "persons suffering from wounds or suppurating ulcers or skin eruptions which may constitute dangerous factors to milk and its products. Persons who are in a general state of uncleanliness." [While the parts of the new Act quoted show a highly enlightened attitude, the author unfortunately does not explain the administrative machinery for making them effective.]

SEELEMANN, M. (1939). Vorkommen und biologisches Verhalten von tier- und menschenpathogenen Streptokokken in der Milch. [**Occurrence and Biology of Milk Streptococci Pathogenic to Man and Animals**].—*Zbl. Bakt. I.* (*Orig.*). **144.** *174–*187. 1 table.

S. divides the streptococci found in milk into two broad groups described as the "pathogenic udder streptococci" and the "non-pathogenic milk streptococci" respectively. He presents a review of our knowledge of the former which he classifies as follows:—*Str. agalactiae*, the atypical form of *Str. agalactiae*, *Str. dysgalactiae*, *Str. uberis*, *Str. pyogenes* (*haemolyticus*) or *Str.*

epidemicus, and *Str. lanceolatus*, adding that only *Str. agalactiae* and its atypical variant are common and that *Str. lactis* may under certain conditions cause a catarrhal mastitis.

A comprehensive table is given in which the main characters of these species are tabulated, *viz*, name, and earlier workers concerned, occurrence, clinical changes produced, morphology in udder secretion and broth, colonial form, characters of the growth in broth, litmus milk, methylene blue milk, and in or on blood agar plates, production of soluble haemolysin, growth on bile blood agar, splitting of sodium hippurate and aesculin, fermentation of various sugars, final pH in lactose broth, and pathogenicity for laboratory animals and human beings.

The article should be consulted for details.
—A. W. STABLEFORTH.

TROSSARELLI, L., & BORELLO, A. (1938). La ricerca del Mycobacterium tuberculosis bovis nel latte del commercio della città di Torino. [**Bovine Type Tubercle Bacilli in Milk Sold in Turin**].—*G. Batt. Immun.* **21.** 545–573. [Numerous refs.] [English, French and German summaries. Abst. from English summary].

The authors found tubercle bacilli in 4% of 310 samples of milk originating from 19 towns in the district which supplies milk to Turin.

ROGICK, F. A. (1940). Presença da *Brucella abortus* no leite. [**Presence of *Br. abortus* in Milk**].—*Rev. industr. Anim.* **3.** No. 1. 7–33. 9 text-figs., 1 fig. on 1 plate, 3 tables. [Numerous refs.] [French summary].

Br. abortus was present in 19 out of 50 milk samples from cows with positive agglutination reactions.

The position is reviewed with regard to human and bovine brucellosis in Brazil, particularly in the state of São Paulo.—M. W.

PERINI, P. E. (1939). Sulla presenza e resistenza all'azione del tempo delle brucelle nel burro del commercio. [**The Presence and Viability of Brucella in Butter**].—*Igiene mod.* **32.** 137–141. 1 table. [4 refs.] [Abst. from author's conclusions].

Butter made from pasteurized cream was found never to contain brucella, whilst they were found rarely in butter made from raw cream. Brucella usually died out in artificially infected butter in 72 hours, but remained viable in an exceptional case up to ten days.

FRICKERS, J. (1939). Vleeschkeuring, vleesch en slachtveeteelt in Suriname. [**Meat Inspection in Dutch Guiana**].—pp. 49. 12 figs. Paramaribo: Drukkerij Eben Haezer (P. A. May). [8vo].

In a lecture given at Paramaribo F. described the progress made in the production of slaughter animals and in meat control in Dutch Guiana. He pointed out that data revealed by meat inspection are valuable in the improvement of animal industry. The first meat-inspection regulation was made by the government in 1828, although the first veterinary official (S. DE LANGE) arrived only in 1893. In 1899 a public abattoir was opened at Paramaribo, when meat inspection was built up on a scientific basis, including the control not only of the animals and the meat but also of the slaughterers and their premises.

F. gives an account of the principal diseases detected. Anthrax and pasteurellosis occur most often in imported animals. Swine fever also occurs. Tuberculosis is most widespread in Coronie where the infection reached a percentage of 25 in 1917 and 60 in 1933. Rinderpest was imported once from Brazil, but was eradicated. Actinomycosis, cysticercosis and echinococcosis in the meat have made it necessary to seize many carcasses. Trichinosis was detected in imported pigs in 1915. Stephanurosis has recently been very frequent, involving the seizure of nearly all the livers and kidneys. Strongylosis caused a very high mortality in 1936 infecting 70% of the young pigs. Piroplasmosis, anaplasmosis, and trypanosomiasis have occasionally been diagnosed in animals in very poor condition.

To protect the livestock of the country F. advised stricter control measures at the frontiers, the importation of slaughtered animals being less necessary than it was formerly.

The working costs of the abattoir are published and set out in graphs. The consumption of fresh meat which was 183,000 kg. of beef and 33,253 kg. of pork in 1918 reached respectively 377,000 kg. and 116,454 kg. in 1937. From 1900 to 1938 slaughtered bovines increased from 7,000–20,000, and pigs from 2,600–6,000.

The importation of salted meat is now much less than previously, being only necessary in the districts situated far from the farms.—L. T.

THERAPEUTICS

BLICKE, F. F. (1940). **Development of New Organic Chemicals for Therapeutic Use.** —*J. Lab. clin. Med.* **26.** 131–138. [7 refs.]

A short review of the new synthetic drugs introduced within the last 50 years. They include general and local anaesthetics (*e.g.* ethylene, cyclopropane, vinethene), hypnotics (especially the barbiturates), pressor and dilator agents (*e.g.* benzedrine and doryl), mercurial diuretics, central stimulants (*e.g.* nikethamide), and chemotherapeutic agents effective against intestinal parasites (*e.g.* carbon tetrachloride, hexylresorcinol), trypanosomes (*e.g.* tryparsamide, germanin), spirochaetes (*e.g.* mapharsen), plasmodia (*e.g.* plasmoquin, atebrin), and many bacteria (the sulphonamides). A number of synthetic hormones and vitamins has also been produced (*e.g.* stilboestrol, vitamin K analogues).—J. M. ROBSON.

MACLEOD, C. M. (1940). **The Inhibition of the Bacteriostatic Action of Sulfonamide Drugs by Substances of Animal and Bacterial Origin.**—*J. exp. Med.* **72.** 217–232. 7 tables. [12 refs.]

The presence of sulphonamide inhibitor was tested for by determining whether the action of sulphapyridine on *Bacterium coli* grown in a synthetic medium was affected. Sulphonamide inhibitor was found in extracts of fresh muscle, pancreas, and spleen of certain animals. When autolysis of tissues occurred the amount of inhibitor was greatly increased. Human urine contained little or no inhibitor, but inhibitor was present after acid hydrolysis. Inhibitor was present in some sterile serous effusions and in pus, but not in blood serum. In some species of bacteria the inhibitor was found in the cells only and not in the culture medium, while in other species it was found in the supernatant fluid and not in the cells. The development of sulphapyridine fastness in a strain of pneumococcus, type I, was accompanied by a greatly increased production of sulphonamide inhibitor.—J. M. ROBSON.

I. LOCKE, R., & MELLON, R. R. (1939). **The Mode of Action of Sulphanilamide.** —*Science.* **90.** 231–232. [11 refs.]

II. ANON. (1940). **Chemotherapeutic Theory [Mode of Action of Sulphanilamide].**—*Brit. med. J.* March 9th. 397–398. [4 refs.]

III. ANON. (1940). **The Action of Sulphanilamide.**—*Ibid.* May 11th. 775–776. [5 refs.]

I. This is a brief communication written in answer to the claims of SHAFFER [(1939). *Science.* **89.** 547.], that both the therapeutic and toxic action of sulphanilamide may be exerted through the mechanism by which the sterilizing oxidation intensity of molecular oxygen is applied nearly at its maximum to bacteria, and unavoidably also to some extent to host cells. The authors are in agreement in so far as a source of sulphanilamide toxicity is indicated. They do not find the available evidence compatible with a concept of identity between the mechanisms producing the known toxic and therapeutic effects, nor with an explanation of the therapeutic usefulness of sulphanilamide in terms of capacity to act as a reservoir for an intermediate substance of high oxidizing intensity. The premises of Shaffer are summarized and alternative suggestions made.

II. The action of sulphanilamide is unknown. Its feeble action *in vitro* cannot support the idea of direct antiseptic action ; it is more likely to act by some subtle interference with the activity of the bacterial cell and by the conversion in the body into some other substance as a powerful bactericide. This was defined by MAYER who showed that *p*-hydroxylaminobenzene sulphonamide was actively bactericidal and might occur in the body from sulphanilamide. Recent observations do not support the idea that therapeutic action depends on anti-catalase activity.

III. It is known that sulphanilamide does not neutralize toxins, nor stimulate leucocyte activity or antibody formation. The work of FILDES and WOODS at the Middlesex Hospital in their search for a substance which would antagonize the bacteriostatic action of sulphanilamide eventually resulted in the discovery of *p*-aminobenzoic acid obtained from yeast. It is essential for the growth of bacteria, the utilization presumably depending on an enzyme reaction subject to complete inhibition by sulphanilamide. In the presence of the latter an essential process is interrupted. SELBIE showed that the simultaneous administration of *p*-aminobenzoic acid with sulphanilamide completely prevented the curative action of the latter on streptococcal infections in mice.

—J. R. M. INNES.

GREEN, H. N. (1940). **The Mode of Action of**

Sulphanilamide. With Special Reference to a Bacterial Growth-Stimulating Factor ("P" Factor) Obtained from *Br. abortus* and other Bacteria.—*Brit. J. exp. Path.* **21.** 38–64. 10 tables. [13 refs.]

Experiments with *Br. abortus* suggest that the survival of a bacterial culture in the presence of sulphonamide depends on the following three factors. (1) The rate of proliferation in the initial growth phase. If the bacterial density in a fluid medium reaches a certain level an amount of some anti-sulphonamide factor sufficient to prevent any further bactericidal action by the sulphonamide accumulates in the medium. (2) The rate at which sulphonamide reaches a bacteriostatic concentration in the cell. (3) The permeability of the cell membrane to the anti-sulphonamide factor, released from the dead or dying cell. Bacterial extracts containing the anti-sulphonamide factor (termed "P" factor) powerfully stimulate the reproductive rate of many bacteria. It is suggested that the "P" factor stimulates the same enzyme reaction in the bacterial cell as sulphanilamide inhibits. It is very probable that the sensitivity to sulphanilamide of any bacterial species or strain is conditioned by the rate at which the autolysing organism liberates "P" factor.—J. M. Robson.

Schalm, O. W. (1940). **The Treatment of Streptococcic Mastitis by Infusion of the Udder with Entozon.**—*J. Amer. vet. med. Ass.* **97.** 20–27. 1 fig., 1 table. [14 refs.]

S. found entozon to be highly lethal for *Str. agalactiae* and he used it as an udder infusion with considerable success. The number of infusions required to effect a cure varies with individual cows; it is influenced by the stage of lactation, the nature of the secretion, and the degree of fibrosis. It is recommended that the infusion be repeated every 7–14 days until *Str. agalactiae* disappears from the milk. Should the udders react unfavourably, then the infusions must be stopped. In lactating animals the infusion was left in the udder for 45 min. to three hours with an average of one hour. With dry cows the infusion was left in the udder overnight. Eleven lactating and 11 dry cows in one herd were treated. 90% of the quarters or 86·3% of the cows were cured.—R. Fisher.

White, H. J. (1939). **The Relationship between Temperature and the Streptococcidal Activity of Sulfanilamide and Sulfapyridine in vitro.**—*J. Bact.* **38.** 549–562. 4 tables, 2 charts. [Numerous refs.]

The minimal bactericidal concentrations of sulphanilamide and of sulphapyridine for each of 6 different initial concentrations of beta-haemolytic streptococcus strain C 203 in PD broth were determined at various temperatures between 30° and 39°C. The results indicate that temperature is a critical factor in the antibacterial action of sulphonamide type drugs *in vitro*, as about 100 times as much sulphanilamide was required to sterilize at 37° as at 39°C. At the latter temperature concentrations of 10 mg. % or less were bactericidal against an average initial bacterial concentration of 50,000 per c.c. At 30°C. concentrates of sulphanilamide lower than 1,000 mg. % were inactive, while concentrations lower than 100 mg. % were inactive at 36°C. Sulphapyridine was similarly influenced by temperature, but at a higher level of activity. Comparison of data for sulphapyridine and sulphanilamide indicated that the average *in vitro* activity is about 4·5 in favour of sulphapyridine.

—R. Allcroft.

Karlson, A. G., & Feldman, W. H. (1940). **Sulfapyridine in Avian Tuberculosis. The Effect of Sulfapyridine on the Bacillaemia of Rabbits Infected Experimentally with Avian Tubercle Bacilli.**—*Amer. Rev. Tuberc.* **42.** 146–150. 1 chart. [3 refs.]

Experiments were performed on 16 rabbits. The daily administration of sulphapyridine failed to prolong the lives of those artificially infected with avian tubercle bacilli or to modify the gross changes characteristic of the Yersin type of TB. In rabbits that received sulphapyridine before being infected and twice daily afterwards, the number of cultivable avian tubercle bacilli in the blood was much lower than in untreated controls or in controls in which the treatment started after the inoculation.—J. M. Robson.

Mello, A., & Rogick, F. A. (1939). Ensaio de quimioterapia nas bruceloses. I.—Sulfanilamida-Dagenan. [**Chemotherapy of Brucellosis. I. Sulphanilamide Compounds**].—*Rev. industr. Anim.* **2.** No. 4. 93–108. 6 text-figs. 1 fig. on 1 plate, 1 table. [Numerous refs.] [English and French summaries].

Using rabbits and g. pigs, the authors experi-

mented with various sulphanilamide compounds in the treatment of brucellosis. Results were checked by agglutination tests and by P.M. examination. The compounds used were "anaseptil" (10% solution of sodium *p*-succinilaminophenylsulphamide), streptoclase (1% solution of *p*-aminophenylsulphamide) soluseptasine, sulfalyso (1% solution of sulphamide), picol (5% solution of sulphamide) and dagenan (M & B 693).

The results showed that the therapeutic effects of the compounds were negative except in the case of dagenan, which caused a rapid decrease in the agglutinin titre of the serum; P.M. examination is stated to have confirmed its curative effects —MILLER WATSON.

GRUBER, W. (1938). Untersuchungen über die chemotherapeutische Wirkung des Kaliumpermanganats gegen Brucella-Abortus Bang. **[Chemotherapeutic Action of Potassium Permanganate against Brucellosis]**.—*Inaug. Diss., Munich.* pp. 23. 12 tables. [14 refs.]

This is a rather inconclusive paper in which considerable attention is given to the toxicity of the salt and the lesions due to overdosage. The chemotherapeutic tests against experimental brucella infections in g. pigs were entirely negative.—J. R. M. INNES.

I. LENTZ, W. (1939). Erfolgreiche Beeinflussung der Brucellainfektion bei Schweinen durch Injektionen von Weizenkeimöl "Enoulan". **[Successful Use of Injections of Wheat Germ Oil ("Enoulan") in Brucella Infection in Swine]**.—*Berl. Münch. tierärztl. Wschr.* Feb. 24th. 120–121. [4 refs.]

II. LENTZ, R. W. (1939). Weitere Versuchsergebnisse über die günstige Beeinflussung der Brucellainfektion beim Schwein durch Injektionen vom Weizenkeimöl "Enoulan". **[The Favourable Influence of Injection of Wheat Germ Oil ("Enoulan") on Brucella Infection in Swine]**.—*Ibid.* Aug. 25th. 533–534. [2 refs.]

I. A relationship between vitamin E deficiency and *Br. abortus* infection has been suggested. L. tested the effect of the injection of wheat germ oil ("Enoulan") on 15 pigs; another series of 14 were kept as controls. All were infected with *Br. abortus*. In the treated pigs there were four sows which aborted as compared with nine in the untreated group. L. concludes that vitamin E does indeed raise resistance to natural brucella infection.

II. This article gives the results of an extension of the above experiments from which L. claims that further support was obtained for the contentions given above. In addition he contends that vitamin E supplements also influence the course of the disease.—J. R. M. I.

MCINTOSH, J., & SELBIE, F. R. (1941). **Chemotherapy of Gas Gangrene.**— *Lancet.* **240.** 240–242. 2 figs., 5 tables [16 refs.]

Sulphanilamide, sulphapyridine, and sulphathiazole were found to be of great value in preventing the development of gas gangrene produced by *Clostridium welchii*, *Cl. septique*, and *Cl. oedematiens* in mice, provided that they were administered locally in large quantities and soon after infection. All three drugs were found to have much the same value against *Cl. welchii* infections, but sulphathiazole was of greater value than the other two against *Cl. septique* and *Cl. oedematiens*.—J. M. ROBSON.

HAWKING, F. (1941). **Prevention of Gas-Gangrene Infections in Experimental Wounds by Local Application of Sulphonamide Compounds and by Sera.**— *Brit. med. J.* Feb. 22nd. 263–268. 6 tables, 1 graph. [Numerous refs.]

Experimental wounds (with crushed muscle and the presence of a foreign body) were made in g. pigs, and large numbers of gas gangrene organisms were inserted; untreated animals died within 24 hours. Application of sulphonamide compounds (sulphanilamide, sulphapyridine, sulphathiazole) to the wounds at the same time as insertion of the organisms saved a large proportion of the animals infected with *Clostridium welchii* and with *Cl. septique*, but had only slight influence on infections with *Cl. oedematiens*. Sulphathiazole was the most effective compound and local application to the wound was more effective than intraperitoneal injection. Sulphanilamide was absorbed from wounds very quickly (in less than 24 hours), giving a high but transitory concentration in the fluids of the wound; sulphapyridine was absorbed slowly from the wound (in 7–10 days) and its concentration was low; sulphathiazole occupied an intermediate position. The development of infection in these wounds could also be prevented by the administration of antitoxin. It is recommended that war wounds should be protected against the development

of gas gangrene by the local application of sulphonamide compounds together with the injection of antitoxins.—J. M. Robson.

Neitz, W. O. (1939). Die Wirkung von Uleron auf das Herzwasser (Rickettsia ruminantium) der Schafe. **[The Action of Uleron on Heartwater (*Rickettsia ruminantium* Infection) in Sheep].**—*Berl. Münch. tierärztl. Wschr.* March 3rd. 134–136. 4 tables.

N. states that in Onderstepoort many chemotherapeutic experiments have been tried without success, using all the medicinals known to have an action against malaria, piroplasmoses, and trypanosomiasis. Tables are given to show that uleron is well tolerated by sheep when injected intravenously and has a decided beneficial effect on the disease produced experimentally in sheep. Thirty-nine out of 41 artificially infected sheep responded to treatment, compared with 11 spontaneous cures among 37 untreated animals.—J. R. M. Innes.

Findlay, G. M. (1940). **The Action of Sulphanilamide on the Virus of Lymphogranuloma Venereum.**—*Brit. J. exp. Path.* **21.** 356–360. 2 tables. [5 refs.]

p-Aminobenzoic acid inhibits the chemotherapeutic action of sulphanilamide on the virus of lymphogranuloma venereum injected intracerebrally into mice. This acid, or some closely allied compound formed from it in the tissues, thus appears to be an essential metabolite for the virus of lymphogranuloma venereum.
—J. M. Robson.

Hobson, R. P. (1940). **Sheep Blow-Fly Investigations. VIII. Observations on Larvicides and Repellents for Protecting Sheep from Attack.**—*Ann. appl. Biol.* **27.** 527–532. 2 tables. [12 refs.] [For part VII, see *V. B.* **10.** 342].

Various substances were tried as sheep dips to control *Lucilia sericata*. The most effective was a proprietary arsenic-sulphur dip which gave protection for 3–4 weeks.

Vegetable oils, especially cotton-seed oil, gave promising results as fly repellents, but no substance was found to be effective for more than two weeks.—W. Moore.

Freney, M. R., & Graham, N. P. H. (1939). **A New Dressing for Fly Struck Sheep.**—*J. Coun. sci. industr. Res. Aust.* **12.** 311–318. [2 refs.]

The authors propose a new dressing which is cheaper than glycerin-diboric dressing; its percentage composition by weight is as follows:—potassium hydroxide 4·9, boric acid 12·5, oil of camphor 13·2, oleic acid 2·5, water to make 100. This dressing was tested on a large number of crutch strikes in the field; although there were a few cases of re-strike, the results indicated that the new mixture is superior to glycerin-diboric dressing in its ability to penetrate the fleece, and at least equal to the latter in larvicidal and healing properties. The dressing leaves no maggots alive in the wound, but of those escaping some reach the fly stage. For one or two days after application, the dressing repels blowflies and small bush flies; it does not mat the wool and appears to have no harmful effect on the skin or wound. There was no evidence that scab formation is increased by this dressing; treated wounds heal readily.
—R. P. Hobson.

Lennox, F. G. (1939). **Growth Retardation as a Measure of the Larvicidal Action of Drugs on Lucilia cuprina. [Correspondence].**—*Aust. J. Sci.* **2.** 92–93. 1 fig. [3 refs.]

L. proposes a new method of testing stomach insecticides by studying their inhibiting effect on growth at sublethal doses. Experiments are described with larvae of the Australian sheep blow-fly, *L. cuprina*, fed on synthetic media containing nicotine. The curve of relationship between drug concentration and growth retardation is sigmoid, the maximum effect occurring in the vicinity of 50% retardation; thus, the general form resembles the normal type of dosage-mortality curve. In choosing a single value to indicate toxicity, the concentration producing a 50% retardation should be taken. Similar growth retardation was observed with boric acid and sodium arsenite.

L. points out that, in the case of blowfly strike, retardation of larval growth is of great importance, in contrast to many insect control problems in which only a complete kill possesses any value.—R. P. Hobson.

I. Cobbett, N. G. (1940). **An Effective Treatment for the Control of the Sheep Head Grub, Oestrus Ovis, in Areas Where the Winters are Cold.**—*J. Amer. vet. med. Ass.* **97.** 565–570. 3 figs., 1 table.

II. Cobbett, N. G. (1940). **A Method of Large-Scale Treatment of Sheep for the Destruction of Head Grubs (=Oestrus Ovis).**—*Ibid.* 571–575. 6 figs.

I. The first paper describes investigations

regarding treatment, based on observations made over a three-year period at Las Vegas, New Mexico. It was observed that the young larvae laid by the female fly remained on the nasal mucous membrane throughout the winter and did not migrate into the sinuses for further development till the spring. Accordingly, the aim of the present investigations was to find some means of killing the larvae while they remained on the nasal mucosa.

Solutions of lysol were most effective, a method of irrigating the mucous membrane being previously determined by injecting a tissue stain into the nostrils of the sheep while their heads were held in different positions. The nasal mucosa was most completely stained in sheep that had been restrained on their backs with their heads slightly elevated and also by the staining solution being injected at a pressure at 35–40 lb. per sq. in. A 3 % aqueous solution of lysol gave the best results.

Treatment was administered during late autumn and early winter. Approximately 1 fluid oz. was injected into each nostril. 90 % of the existing infestation was removed by a single treatment, while two treatments given at five-day intervals eliminated 98 % of the infestation.

II. The apparatus which was developed to treat large flocks of sheep is described. Briefly, this consisted of a special restraint table, air pressure apparatus, and a solution storage tank.

During 1936–39 inclusive, 90,000 sheep in 45 flocks were treated by this method. Seven hundred sheep per hour could be dealt with. The results of the treatment were satisfactory.

—A. L. Wilson.

Bruce, W. G. (1939). **The Use of Phenothiazine in the Medication of Cattle for the Control of Horn Flies.**—*J. econ. Ent.* **32.** 704–706. [2 refs.]

A dose of 22 mg. of phenothiazine per kg. body weight was necessary, mixed with the food, to prevent development of *Haematobia* [*Lyperosia*] *irritans* larvae in cattle faeces. This amount rendered unfavourable for the larvae the dung excreted during approximately 24 hours, beginning 12 hours after administration. Larger doses than this caused physiological disturbances, shown by loss of appetite, rough hair, arched back, dull eyes, and general haggard appearance.

When phenothiazine was mixed directly with the faeces, the M.L.D. was 4 mg. per 100 g.

—W. Moore.

Hasskó, A., & Turgay, I. (1940). Versuche über den Wirkungsmechanismus der Leberegelmittel. I. [**Experiments on the Mode of Action of Liver Fluke Remedies. I**].—*Berl. Münch. tierärztl. Wschr.* Jan. 19th. 28–29. 2 tables.

The lethal effect of several drugs on the liver fluke was tested *in vitro*. Various solutions of the drugs in benzol were used, since it had been determined that flukes live for some time in this substance. Alcohol, nicotine, santonin, and oil of chenopodium were used as controls.

The most lethal drugs were filicin and kamala which killed the flukes in from 3·6–7·6 min. in a dilution of 1 : 1,000. The flukes remained alive for 28 min. in a 1 % solution of carbon tetrachloride, hexachlorethane, arecoline, or oil of chenopodium. Arsenic was not very lethal to the flukes. Synergism was noticed *in vivo* but not *in vitro*, and it is suggested that its occurrence is dependent on substances present in the living animal.

—A. L. Wilson.

I. Maplestone, P. A., & Mukerji, A. K. (1940). **Comparison of Thymol and some other Drugs in the Treatment of Hookworm Infection.**—*Indian med. Gaz.* **75.** 193–197 and 200. 4 tables, 2 charts. [9 refs.]

II. Lane, C. (1940). **Thymol as an Anthelminthic.**—*Lancet.* **239.** 349. [8 refs.]

I. Records experiments undertaken to determine the respective values of thymol, tetrachlorethylene and a combination of tetrachlorethylene and oil of chenopodium in the treatment of human hookworm infestations. These investigations showed that tetrachlorethylene was the best drug. Compared with thymol it is cheaper, more easily dispensed, may be mixed directly with the purgative and given as a single dose, is less toxic and more effective.

II. A criticism of the experiments and findings contained in the first. L. states that the dose of thymol administered was too small and was, moreover, smaller than the widely accepted dose. From his experience of 50,000 treatments with thymol and from an examination of the relevant literature, L. concludes that thymol is still the safest of all anthelmintics for hookworms.—A. L. Wilson.

I. Taylor, E. L., & Sanderson, K. M. (1940). **Phenothiazine—a Remarkably Efficient Anthelmintic.**—*Vet. Rec.* **52.**

635–639 and 640–647. 10 tables. [14 refs.]

II. LAPAGE, G. (1940). **Experiments on the Anthelmintic Action of Phenothiazine.**—*Ibid.* 648–657. 4 tables.

III. MCEWEN, A. D. (1940). **Comparative Tests on the Treatment of Lambs with Phenothiazine and with Copper Sulphate and Nicotine Sulphate.**—*Ibid.* 657–658. 3 tables.

IV. ROWLANDS, W. T. (1940). **Phenothiazine in Parasitic Gastritis.**—*Ibid.* 658–660. 1 table.

V. GRAHAME, T., MORGAN, D. O., & SLOANE, J. E. N. (1940). **Report on Phenothiazine as an Anthelmintic in Horses.**—*Ibid.* 660–663. 11 tables.

VI. KNOWLES, R. H., & FRANKLIN, A. V. (1940). **Treatment of Equine Strongylosis by Phenothiazine.**—*Ibid.* 663–664.

VII. FOGGIE, A. (1940). **Some Experiences with Phenothiazine.**—*Ibid.* 784–785.

VIII. TAYLOR, E. L. (1940). **Mr. Foggie's Observations on Phenothiazine. [Correspondence].**—*Ibid.* 842.

I. This deals with work carried out in various parts of Gt. Britain and co-ordinated through the Agricultural Research Council. Particulars are from a large number of experiments carried out by different workers on the various domestic animals. The numbers of animals involved were 150 horses, 12 cattle, 300–400 sheep, and 70–80 goats. The experiments show that in horses in doses of 30–40 g. the drug is 100% efficient. In ruminants also it is efficient in the removal of stomach worms, but is less efficient in the removal of worms from the small intestine. Cattle are much less tolerant to the drug than are either horses or sheep. Sheep are particularly tolerant and although a dose of 10 g. is adequate, one of 400 g. has been given with no ill effect. Idiosyncrasy has been observed in goats in that a particular group showed sensitivity on one occasion and marked tolerance on another. The tasteless character of the drug permits of its administration in the food.

II. Records of experiments in a considerable number of sheep, a few cattle, one goat, and a few horses. It is shown that in sheep a dose of 5 g. has a significant effect, and in calves six months old, doses of 80–125 g. have no toxic effect. In the case of one of the horses two doses of 500 g. were given at an interval of 49 days and, while the first dose resulted in little disturbance, the second gave rise to illness persisting for several days.

III. Three experiments were carried out. In one the lambs were divided into three groups. One group was treated with phenothiazine, one with copper sulphate and nicotine sulphate, and the third was not treated. The lambs were dosed at fortnightly intervals from December to the end of April, the phenothiazine being given in doses of 30 g. In the other two experiments the lambs were divided into two groups only, no controls being used, and phenothiazine was given in doses of 10 g. The results of all the experiments showed that phenothiazine is a more effective anthelmintic than copper sulphate and nicotine sulphate.

IV. An account of the treatment of a small number of sheep, mainly ewes, showing that phenothiazine is an efficient anthelmintic in doses of 20 g.

V. An account of the treatment of about 100 horses, using doses ranging from 20–100 g., which shows that the minimum effective dose is in the region of 30 g. No ill effect was observed following the administration of even the larger doses. The drug was administered in the food, the morning feed being omitted and the dose given in a bran mash at the midday feed.

VI. Three horses were successfully treated, in two cases with doses of 60 g. and in the third with 100 g.

VII. Using doses of 45–60 g., F. obtained good results in young cattle. In cases where egg counts were made, they were found to be much reduced after treatment.

In sheep, the results obtained with doses up to 20 g. were very poor. It is suggested that this may have been due to the fact that the infestation was a mixed one.

VIII. T. points out that, while the worm egg counts in the cattle treated by FOGGIE [see VII] were definitely high, those in the sheep were distinctly low, and suggests that the explanation of his results is that, whereas the cattle were suffering from parasitic gastritis, the sheep were not.—W. J. IRONSIDE.

BAKER, D. W., & WILLMAN, J. P. (1940). **Control of Worm Parasites in Market Lambs.**—*Cornell Vet.* **30.** 401–404. 1 table. [3 refs.]

Experiments are described to test the comparative efficiency of a mixture of copper sulphate and nicotine sulphate and of tetrachlorethylene in oil as anthelmintics in sheep.

One group of 14 lambs and one wether received 8 oz. of 1% copper sulphate + 1% nicotine sulphate solution each. A similar group reared under the same conditions received 10 c.c. of equal parts of tetrachlorethylene and mineral oil. The latter dose was immediately preceded by swabbing the mouth with 5% copper sulphate solution. The sheep which received the copper sulphate in nicotine sulphate solution reached optimum market condition on an average 83·3 days after dosing and were then slaughtered. Those, however, which received tetrachlorethylene in oil required only 62·6 days. Tetrachlorethylene appeared to be more effective for the control of helminths of the abomasum and small intestine, while copper sulphate-nicotine sulphate solution provided better protection against the parasites of the large intestine.—D. D. Ogilvie.

Habermann, R. T., & Hunt, W. H. (1940). **Effect of Commercial Phenothiazine on a Heavily-Parasitized Ram.**—*Vet. Med.* **35.** 298–300. 3 figs. [2 refs.]

The authors report on the marked improvement in general condition of a heavily parasitized ram, after a single dose of 25 g. of non-conditioned commercial phenothiazine. This animal gained 51 lb. in the three months following dosing. Large numbers of nematodes were recovered from the faeces immediately after treatment.—K. M. Sanderson.

de Jesus, Z., & Cabrera, D. J. (1940). **Anthelmintic Value of Tobacco Midrib Powder Mixed with the Daily Feed Mash of Infected Chickens.**—*Phillip. J. anim. Indust.* **7.** 251–262. 2 figs. on 1 plate, 2 tables. [7 refs.]

Tobacco midribs occur as a by-product in the manufacture of cigars and cigarettes. The dried and powdered product given together with sodium sulphate in dry mash for a period of 3–7 days was found to be effective in removing round worms and tapeworms from fowls.

The treatment does not necessitate a period of fasting, does not affect egg production, and does not result in tainting of the flesh of the bird or of the eggs laid. The doses per day are 5–7 g. powdered tobacco midribs and 5–7 g. sodium sulphate. Given in wet mash the anthelmintic action is more rapid but purging occurs. Given without sodium sulphate the powder is much less effective.—W. J. Ironside.

Paabo, A. (1940). Terapeutilise pneumotooraksi toimest vereringesse ja muid tähelepanekuid hobuste kroonilise kopsu-alveolaaremfüseemi ravimisel. **[The Treatment of Broken Wind by Pneumothorax and its Effect on the Circulatory System].**—*Eesti loomaarstl. Ring.* **16.** 15–28. 3 tables. [8 refs.] [Abst. from author's English summary].

P. treated broken wind in 39 horses by making 64 insufflations of air into the pleural cavities. All these cases occurred without any undesirable disorders of the heart or circulatory system, except for some functional disturbances such as heart weakness and disordered rhythm; extrasystoles or increase in the pulse rate usually disappeared within 30 min. In one case the extrasystole ceased after about four hours and another after six hours. The accentuation of the second heart sound decreased or even ceased, under the influence of insufflation.

In one of the two horses where the heart missed every fourth beat, the intermittency after collapse therapy was 2–3 beats every two minutes, in the other horse the normal action of the heart was restored. Exact diagnosis of the functional heart disorders is only possible by use of the cardiograph.

After insufflations of air into pleural cavities in horses P. measured the increase of the pulse rate and the number of respiratory movements during the time when the intra-thoracic pressure was equal to zero. By insufflation of air into the right pleural cavity, the pulse rate increased by 9·13 beats, and the number of respirations by 9·00 per min.; by the same treatment of the left lung the corresponding increases were 9·1 and 6·33 per minute respectively.

The average value of the intra-thoracic pressure after the treatment was + 3·44 mm. Hg in the right pleural cavity, and + 3·95 mm. Hg in the left.

Brüstle. (1940). Beitrag zur Behandlung des Petechialfiebers der Pferde mit Calcium chloratum. **[Treatment of Purpura in Horses with Calcium Chloride].**—*Z. Veterinärk.* **52.** 25–40. [16 refs.]

Purpura or morbus maculosus has been regarded as a secondary complication to some other disorder although its aetiology is unknown. B.'s observations hardly bear this out. It is characterized by petechiae in the skin, subcutaneous tissues, and mucous membranes and is often accompanied by oedematous swellings in various parts of the body. The various theories of the aetiology are discussed.

MAREK initiated the treatment of this disease with calcium chloride. B. confirmed its beneficial effect in three horses using a 7·5% solution injected intravenously, definite improvement being seen within three days after treatment was begun.—J. R. M. INNES.

MOSKEY, H. E. (1940). **Poultry Remedies Under the New Food, Drug, and Cosmetic Act.**—*J. Amer. vet. med. Ass.* **96.** 3–4.

M. states that under this act the inter-state traffic in poultry remedies is prohibited except under licence. He discusses the misrepresentation of remedies, the inefficiency of many advertised drugs, and the use of such terms as "conditioner", which is now banned from food and drug labels. Finally, he comments on some drugs which have been recommended in poultry papers, text-books and poultry congresses, such as hypochlorite powder for respiratory diseases and phenolsulphonate for intestinal diseases, which are useless for the treatment of such conditions.—R. FISHER.

HELMHOLZ, H. F. (1940). **Chemistry in Urinary Antisepsis.**—*Chemistry and Medicine.* pp. 212–222. 1 table. [18 refs.] Minneapolis: University of Minnesota Press.

The history of urinary antisepsis is outlined, from the earliest unsatisfactory attempts to cure infection of the urinary tract by changing the reaction of the urine from acid to alkaline or *vice versa*, depending on the condition of the urine at the time infection was discovered, to the latest successful procedures with mandelic acid and the new sulphone derivatives. Of particular interest is the contrast between the earlier experiments with compounds such as hexylresorcinol and methenamine, the subsequent experiments on ketogenic diets, and the final purposeful synthesis of a series of special derivatives. At first the chemist suggested compounds for the clinician to try, *e.g.* methenamine which was safe to administer, but which became bactericidal as formaldehyde was split off in passing from alkaline plasma to acid urine. Later the clinician observed antiseptic properties in urine of patients on ketogenic diets and left the chemist to implicate oxybutyric acid at low pH, and to follow this up with the substitution of mandelic acid for β-oxybutyric. Still later work on sulphanilamide, which acts equally well in alkaline urine and is still excreted in bactericidal concentration by the damaged kidney, filled in the weak spot in the armamentorium of treatment.

Of special interest, also, is the discussion on resistance of strains of bacteria to sulphanilamide, sulphapyridine, mandelic acid, oxybutyric acid, and benzochrome. Organisms resistant or susceptible to sulphanilamide were also resistant or susceptible to sulphapyridine, but the specific behaviour of individual strains disappeared when tested against mandelic acid or benzochrome. Tested with β-oxybutyric acid the strains resistant to sulphanilamide were more easily killed than the susceptible strains.

Properly administered the range of urinary antiseptics now at disposal should cure most of the infections in patients with intact kidneys and unobstructed urinary tracts, but the treatment of patients with renal damage, and of those with alkaline urine produced by urea-splitting bacteria, is still a problem.—H. H. G.

POISONS AND POISONING

SMITH, M. I., & LILLIE, R. D. (1940). **Studies in Chronic Selenosis. Part I. The Chronic Toxicity of Naturally Occurring Food Selenium.**—*Nat. Inst. Hlth Bull.* No. 174. pp. 1–13. 4 figs., 5 tables. [18 refs.]

SMITH, M. I., & STOHLMAN, E. F. (1940). **Studies in Chronic Selenosis. Part II. Gastric Acidity in Chronic Selenium Poisoning.**—*Ibid.* pp. 15–19. 4 tables. [5 refs.]

SMITH, M. I., WESTFALL, B. B., & STOHLMAN, E. F. (1940). **Studies in Chronic Selenosis. Part III. Liver Function and Bile Pigments in Experimental Chronic Selenium Poisoning.**—*Ibid.* pp. 21–44. 6 figs., 10 tables. [Numerous refs.]

WESTFALL, B. B., & SMITH, M. I. (1940). **Studies in Chronic Selenosis. Part IV. Selenium in the Hair as an Index of the Extent of its Deposition in the Tissues in Chronic Poisoning.**—*Ibid.* pp. 45–49. 1 table. [5 refs.]

I. It is considered that continued excretion of selenium in the urine up to a level of 500 μg. % need not necessarily be associated with pronounced symptoms of selenium poisoning in animals or man. Food selenium is less toxic

than sodium selenite or selenate. The provisional safety limit for selenium in food is regarded as 0·5 mg. per kg. body weight per day. Experiments on cats, rabbits, and rats showed that 1 mg. per kg. per day is dangerously toxic, that 0·5 mg. is usually safe, but that even 0·2 mg. given over long periods may sometimes cause minor systemic effects such as gastric derangement.

II. Diminution of free or total gastric acidity was not found to be an essential feature of chronic selenosis in cats or rats.

III. Experiments on rabbits and cats showed that chronic poisoning by voluntary ingestion of foods containing selenium is associated with appreciable chronic interstitial hepatitis. The rose-bengal test seemed more specific in discerning liver dysfunction than the bilirubin or hippuric acid tests.

IV. Data are presented from simultaneous analyses of hair, liver, kidneys, blood, and urine of cats and rabbits fed on selenium-bearing cereals for considerable periods. The method for selenium determination in biological materials is described in detail. In cats, receiving 0·1–1·0 mg. selenium per kg. body weight per day over periods from 90–353 days, values ranged from 970–3,300 μg. % for hair, 235–2,000 μg. for kidney (wet weight), 335–1,620 μg. for liver, 75–340 μg. for blood, and 50–590 μg. for urine. In general the rise in concentration from blood to urine was about two-fold, urinary value falling faster than blood value after cessation of selenium feeding.

[The work arose from consideration of the dangers for human consumption of foods derived from areas in which "alkali disease" occurs in domesticated ungulates.]—H. H. G.

Boyd, F. T., Aamodt, O. S., Bohstedt, G., & Truog, E. (1938). **Sudan Grass Management for Control of Cyanide Poisoning.**—*J. Amer. Soc. Agron.* **30.** 569–582. 4 figs., 2 tables. [12 refs.]

The object of this investigation was to determine the factors involved in the poisoning of stock by the cyanogenetic glucoside of Sudan grass, which is otherwise a very satisfactory pasture grass. It was found that the short, dark green grass was high in cyanide, especially during the time of second growth. When over 2 ft. in height, or when of pale colour irrespective of height, Sudan grass was found to be of low cyanide content. A low level of available nitrogen and a high level of available phosphorus tended to decrease the cyanide content of the plant. It is recommended that Sudan grass should not be grazed by stock until it has reached a height of at least 18 in. The various points of farm management enabling this practice to be carried out are described.

—Alastair N. Worden.

Graham, R., Hester, H. R., & Henderson, J. A. (1940). **Coal-Tar-Pitch Poisoning in Pigs.**—*J. Amer. vet. med. Ass.* **96.** 135–140. 3 figs. [4 refs.]

Coal-tar-pitch poisoning in pigs occurring naturally and induced experimentally is described. In two of the four outbreaks described the pigs had access *ad libitum* to coal-tar pitch in the form of expended clay pigeons employed by gun clubs in shooting practice, it being the chief ingredient of clay pigeon targets. The diet items were yellow maize, commercial protein supplement, commercial mineral, and alfalfa pasture. Wild cherry and bull nettles were found occasionally in the field. The plants caused no illness to pigs fed experimentally nor was there any liver lesion on autopsy. Adults were not affected but 10–20% of young pigs succumbed in each of the four outbreaks. The symptoms were inappetence, tucked up abdomen, rough coat, weakness and depression. The gross lesions at autopsy were jaundice of the subcutaneous tissues, marginal congestion of the lymph nodes of the body and oedema of the visceral lymph nodes. The liver presented a red and yellow mottling, the entire organ being involved in advanced cases. Sections revealed diffuse toxic degeneration. Liquid coal tar, lead shot, and powdered clay pigeon remnants alone and with lead shot were fed experimentally. The evidence suggests that coal-tar-pitch poisoning may be responsible for spontaneous outbreaks of liver degeneration in pigs.—R. Bamford.

Mace, D. L. (1940). **Horses in Chemical Warfare.**—*Vet. Bull. U.S. Army.* **34.** 95–112. [9 refs.]

A review of the information on the effects of war gases on army animals is presented. In discussing the lung irritant gases the effects of exposure to "low", "small", and "large" concentrations are described, but no more precise information is given regarding the concentration of, and time of exposure to, the gases. The beneficial action of venesection in phosgene poisoning is attributed to the sudden change in the pressure ratio between the circulation and tissue with a subsequent

dilution of the blood with fluid from the tissues. The arrest of pulmonary oedema aids the patient in obtaining more oxygen from the alveolar air; the diluted blood makes possible a freer circulation, reducing tissue anoxaemia and relieving cardiac embarrassment.

Mustard gas, lewisite and ethyldichlorarsine are described as the principal vesicant gases. The vapour of mustard gas in field concentrations exerts little effect on the larger animals, but the sensitivity of the skin of the horse to the liquid gas is about the same as that of man although certain parts are more sensitive. Treatment is confined to first aid (decontamination). Because of the rapid hydrolysis of lewisite in the presence of moisture, M. believes that it will not be used extensively in warfare.—R. BAMFORD.

BAMFORD, R. M. (1940). **Mustard Gas and Army Animals.**—*J. R. Army vet. Cps.* **11.** 113–128. 1 text-fig., 5 figs. on 2 plates, 1 table. [5 refs.]

The physical and chemical properties of mustard gas are briefly described. Because of its relative chemical stability, and its power of solubility and penetration, protection against the gas is very difficult. The action on tissue is that of a cell poison resulting in necrosis. A distinction is drawn between the effects caused by the liquid gas and the vapour; the action of the latter when encountered in field concentrations is weak except upon the eyes. Drops of the liquid gas falling on the skin cause the appearance of tufts of erect hairs, followed by oedema, superficial necrosis, and the gradual sequestration of the dead portion of the skin. Decontamination (first aid treatment) aims at neutralizing and removing the poison before it is completely absorbed by the skin. The success of this early treatment depends upon the speed with which it is employed after contamination and many practical difficulties must be expected. Individual and collective protection are discussed and the methods of dealing with contaminated fodder and water are described. The mule is more sensitive than the horse to mustard gas and also less tolerant to bleaching powder applied either as a watery paste or as an ointment. The camel is relatively resistant.

PHYSIOLOGY

ISAACS, R., STURGIS, C. C., BETHELL, F. H., & GOLDHAMER, S. M. (1940). **Blood. Review of Recent Literature.**—*Arch. intern. Med.* **65.** 1211–1294, and **66.** 173–225. [Numerous refs.]

This review contains data from selected articles published in 1939 with a few from previous years and gives a survey of the facts relating to disorders of the blood such as pernicious anaemia and other macrocytic anaemias, haemolytic anaemia, sickle cell anaemia, erythroblastic anaemia associated with cancer and with endocrine dysfunction, iron deficiency, the role of gastric juice in anaemia, and aspects of poisoning by physical agents such as lead and benzene. The blood picture is discussed in nephritis, polycythaemia, purpura, haemophilia, infectious mononucleosis, and a resumé of recent work in blood clotting is given.

The second part of the review deals with granulocytopenia, Hodgkin's disease, lymphosarcoma, and lymphomatoid diseases; a section is devoted to the various aspects of leucaemia including the chemical and pathological picture, and experimental leucaemia in animals. There is a discussion of various haematologic methods.

—R. ALLCROFT.

COGHILL, R. D., & CREIGHTON, M. (1938). **The Nonspecific Nature of the Carbohydrate Portion of Horse Pseudoglobulin.**—*J. Immunol.* **35.** 477–485. 1 fig., 1 table. [20 refs.]

When horse pseudoglobulin is digested with recrystallized preparations of pepsin, trypsin, and chymotrypsin, the loss of specificity of the protein closely parallels the destruction of protein.

A material rich in carbohydrate isolated from such digests and a similar material obtained by hydrolysis of pseudoglobulin with barium hydroxide showed no specific precipitation or inhibition reactions.

It is concluded that the polysaccharide of horse globulins has no specificity analogous to that of the pneumococcal polysaccharide.

—R. A. KEKWICK.

MORRIS, M. L., ALLISON, J. B., & GREEN, D. F. (1940). **Blood Cytology of the Normal Dog.**—*J. Lab. clin. Med.* **25.** 353–360. 2 figs., 2 tables. [5 refs.]

It is suggested by the authors that (1) data recorded from experimental dogs may not establish normal blood values for veterinary practice, and (2) there is insufficient published

	2–8 months (35 animals)		9 months–12 years (31 animals)	
	Range	*Mean*	*Range*	*Mean*
Haemoglobin (g. per 100 ml.)	9·1–17·0	12·6	11·5–18·5	15·1
Red blood corpuscles (10^6 per cu. mm.)	4·1–6·7	5·3	5·2–7·8	6·2
White cells (10^3 per cu. mm.)	8·9–16·0	12·2	8·8–18·4	11·5

information relating to puppies. From the large numbers which are presented at the Raritan Hospital for Animals, Stelton, N.J., 66 healthy animals, mostly of pure breeds, were selected for study by standard techniques. The findings are discussed from the viewpoint of age, puberty being taken as eight months in most breeds, and are best summarized here in tabular form. [See above].

It is concluded that, for all practical purposes, age, sex and breed have little influence upon the r.b.c. counts in adult dogs. The Schilling differential classification is applied to the neutrophile leucocytes, and the results are given in full in the original. It is pointed out that in the dog there is a less clear-cut segmentation of the neutrophile nucleus than in man, and hence, by the Arneth classification, a normal dog's blood would show a "shift to the left" as judged by human standards.

—ALASTAIR N. WORDEN.

AUSTONI, M. E., RABINOVITCH, A., & GREENBERG, D. M. (1940). **The Iron Content of the Tissues of Normal, Anemic, and Iron-Enriched Rats Freed from Blood by Viviperfusion.**—*J. biol. Chem.* **134.** 17–26. 1 fig., 2 tables. [9 refs.]

An operative technique for "viviperfusion" of the rat is described. By this method it is possible to obtain practically blood-free tissues for the estimation of the iron content of the tissues.

The Fe content of various organs, which were rendered almost bloodless by this technique, was determined by oxidimetric titration with titanium chloride. The data for anaemic and normal rats, and for rats which had received daily doses of 1 mg. Fe as ferric chloride and which had been maintained under conditions of reduced atmospheric pressure for about a month, is presented in tabular form. In anaemic animals, loss of Fe was greatest in the liver and spleen, but in those receiving Fe supplements, storage appeared to take place to the greatest extent in bone marrow, and not to any significant degree in either liver or spleen.

—ALASTAIR N. WORDEN.

LASNITZKI, A., & BREWER, A. K. (1940). **Increase of Heavy Potassium in Plasma.** —*Nature, Lond.* **146.** 807–808. [1 ref.]

It has been shown [(1938). *Nature, Lond.* **142.** 538.] that the percentage of the heavy isotope $^{41}_{19}K$ in potassium present in bone marrow and Jensen sarcoma differed slightly from that in mineral potassium, being higher in the first and lower in the second.

Similar investigations carried out on potassium in the blood plasma of normal rats showed that the content of $^{41}_{19}K$ in plasma potassium was distinctly higher than in mineral potassium contained in ordinary pure potassium chloride. The increase was of the same order as that found in potassium from bone marrow.

It is suggested that the assimilation of potassium by the cell is connected with an isotope effect, as potassium from all normal tissues other than bone marrow has shown a $^{41}_{19}K$ content close to that of mineral potassium.

—R. ALLCROFT.

I. COHN, W. E., & GREENBERG, D. M. (1938). **Studies in Mineral Metabolism with the Aid of Artificial Radioactive Isotopes. I. Absorption, Distribution, and Excretion of Phosphorus.**—*J. biol. Chem.* **123.** 185–198. 5 figs. [Numerous refs.]

II. JOSEPH, M., COHN, W. E., & GREENBERG, D. M. (1939). **Studies in Mineral Metabolism with the Aid of Artificial Radioactive Isotopes. II. Absorption, Distribution, and Excretion of Potas-**

sium.—*Ibid.* **128.** 673–683. 4 figs. [7 refs.]

III. COHN, W. E., & GREENBERG, D. M. (1939). **Studies in Mineral Metabolism with the Aid of Artificial Radioactive Isotopes. III. The Influence of Vitamin D on the Phosphorus Metabolism of Rachitic Rats.**—*Ibid.* **130.** 625–634. 3 tables. [20 refs.]

I. A study of P metabolism in rats with the aid of radio-active P administered orally or intraperitoneally as neutral sodium phosphate, showed that the major disposition of injected or ingested P occurred within the first eight hours after administration. Absorption was most rapid in the first two hours but was never complete, as 30–40 % of the ingested P remained unabsorbed. About 20–30 % of the injected or absorbed P was excreted in the urine within eight hours, while about 3 % was excreted in the faeces. Subsequent elimination of this P over a period of five days in both urine and faeces went on at a steadily diminishing rate averaging about 2–1 % per day. The retention of P in the various tissues was in the following decreasing order :– bone, muscle, liver, stomach and small intestine, blood, kidneys, heart, lungs, and brain.

II. Studies similar to those in I were carried out using radio-active potassium administered as potassium chloride. It was found that there is a considerable degree of individual variation in the absorption rate, but most of the K is absorbed from the gastro-intestinal contents within half an hour. Absorption occurs mainly from the small intestine. Retention of K by liver tissue follows the absorption curve very closely both in rise and fall ; the deposition in the liver is only transitory and appears to be incidental to its location in the path of the portal venous system. The uptake of K by skeletal muscle is slow and increases continuously for four hours and then remains at a constant level for about 22 hrs. The constant rate of increase in muscle indicates the essential participation of K in muscle metabolism. Excretion of K through the kidney takes place at a nearly constant rate of about 6–7 % per day.

III. The results are reported of studies on the absorption, excretion, and deposition of radioactive P in the bone and muscle of rachitic rats with and without vitamin D. The most pronounced effect of vitamin D was a 25–50 % increase in the inorganic P fraction of the bone, but very little change in the organic P fraction was noted. This increase of bone P caused by vitamin D appears to be principally at the expense of the most recently ingested P [see also *V. B.* **11.** 50].—R. ALLCROFT.

WEAKLEY, C. E., Jr., & DUSTMAN, R. B. (1939). **The Composition of Different Skeletal Parts of Experimental Animals.**—*Bull. W. Va agric. Exp. Sta.* No. 294. pp. 40. 1 appendix. [Numerous refs.]

This publication deals with an extensive series of analyses of whole bones of the rat, chicken, pig, and heifer (femur, tibia and fibula, humerus, radius and ulna ; sternum in the chicken and metatarsal and metacarpal bones in the heifer) ; in all cases both normal and rachitic subjects were employed. The bones were carefully dissected out of the fresh carcasses and determinations were made of the green weight, moisture, ether extract, ash, and non-fatty organic matter. The iodine number and refractive index of the marrow fat were determined in some cases. The results are presented in the form of 26 appendix tables. The following are the main conclusions :– (1) deficient feeding results in lighter bones of higher moisture and lower ash content in the case of the chicken, heifer, and rat, but produces little or no such analytical differences in the case of the pig, even where rickets is manifested clinically ; (2) the moisture : ash ratio is a sensitive measure of abnormal mineral deposition ; (3) the femur and humerus tend to be higher in moisture and lower in ash than the tibia and radius and ulna, while these in turn show the same relationship to the metatarsal and metacarpal bones ; (4) certain breed differences in the amount of ether-extractable material were noted among pigs ; (5) the percentages of Ca, Mg, and P in the bones of the pigs appeared to be unaffected by the rations employed, and (6) the green weight of the long bones of the pig and the chicken appeared to be slightly heavier on the left side than on the right, the difference being due mainly to the moisture content.—ALASTAIR N. WORDEN.

SMITH, P. E. (1940). **Female Sex Hormones. The Gonadotropic Hormones.**—*Nature, Lond.* **146.** 624–625.

The discovery that the gonads are controlled by a substance (gonadotrophic) elaborated in the anterior pituitary was followed by the finding of three other rich sources of gonadotrophic hormone, *viz*, the urine of pregnant women,

the urine of women at the menopause, and the serum of pregnant mares. The effects of gonadotrophic extracts (the substance has not yet been obtained in a state of chemical purity) vary with the source of the material and with the species of the experimental animal. Some investigators have ascribed these various effects to the fact that there exist two (or more) gonadotrophic hormones. Recent researches have cast doubt on this and suggest that the different types of responses in the test animals may be due to differing rates of absorption of the hormone.—J. M. ROBSON.

HELFET, A. J. (1940). **A New Conception of Parathyroid Function and its Clinical Application. A Preliminary Report on the Results of Treatment of Generalized Fibrocystic and Allied Bone Diseases and of Rheumatoid Arthritis by Aluminium Acetate.**—*Brit. J. Surg.* **27.** 651–677. 22 figs. [Numerous refs.]

Although the action of the parathyroids on Ca metabolism is still not clearly understood it has been generally accepted that the primary function of these glands is the control of the level of Ca in the blood. A few authorities have suggested that it is possible that parathormone exerts its primary effect on the phosphorus metabolism. In this paper this view is elaborated and it is demonstrated that treatment of dysfunctions of the parathyroid should control the P intake.

The suggested theory is that parathormone controls the blood inorganic phosphate level; that it prevents this level from rising to a degree which would upset any metabolic process in which the phosphates are concerned; that conversely, an accumulation of phosphate in the blood is a stimulus to increased secretion of parathormone which effects the control of phosphate by stimulating excretion of PO_4 by the kidney, and by mobilizing Ca ions from the bones resulting in the formation of calcium phosphate, in which form it can be excreted. Hence if the parathyroid glands are removed the body will be unable to deal adequately with the blood phosphate, and excretion will be diminished. The only available supply of Ca ions is the diffusible fraction of serum Ca, and this falls as a result of combining with the excess phosphate, and tetany occurs.

Experimental evidence supports this conception, as the first effect of parathormone injection is an increase in the PO_4 content of the urine, an increase in the Ca content occurring only after an interval. Parathyroidectomy produces the converse effect; elimination of phosphate by the urine is diminished and retention occurs. Hyperplasia of the parathyroids has been produced in rabbits by administration of excess PO_4, and similarly many cases have been described where the retention of PO_4 due to renal disease has been followed by hyperplasia of parathyroid, osteoporosis, and other manifestations of the syndrome of hyperparathyroidism.

In further support of the above theory it is indicated that parathormone mobilizes the Ca carbonate rather than the Ca phosphate fraction of the bone salts and changes the pH of the blood without altering the CO_2 combining power, which effect could occur only if the change concerned the carbonate radicle.

It is shown that these basic principles are equally applicable to the hyperparathyroid state and can explain tetany, which results in high blood P and a decreased PO_4 excretion in the urine. This hypothesis also affords the only feasible explanation of the temporary relief of parathyroid tetany by the administration of lactose or glucose which presumably remove phosphate by the formation of hexose-phosphate until all the hexose has been used and PO_4 ions are again liberated in the blood. Whether the low serum Ca or the high serum P is responsible for the actual manifestations of tetany is difficult to determine, and it is possible that the changes in serum Ca and P are only incidental processes in the production of tetany and that the crucial factor is some change in the acid-base equilibrium. Whichever disturbance causes the syndrome it is concluded that tetany can be prevented by limiting the intake of P; the value of this treatment can be increased by the simultaneous administration of Ca, but Ca itself does not always alleviate tetany.

If it is assumed that retention of PO_4 increases parathormone secretion it is pointed out that this "compensatory" hyperparathyroidism must not be confused with the pathological type associated with an adenoma. A classification of hyperparathyroidism is suggested which divides the condition into three definite groups as regards aetiology, pathology, and treatment. The symptomatology and the role of hyperparathyroidism in various conditions such as generalized fibrocystic disease, rheumatoid arthritis, and osteitis deformans are discussed.

In the treatment of these conditions an attempt was made to reduce the intake of P and thus remove the stimulus to the overproduction of parathormone. An attempt to provide an adequate diet of a constant low P content proved impracticable, and as an alternative the administration of small doses of aluminium acetate was tried and found to have very favourable results. Al combines with PO_4 in the intestine, precipitating insoluble aluminium phosphate which is excreted unchanged by the bowel. Care must be taken that too large a dose is not given as excess can produce rickets. The amount given daily (♏ 75 of the B.P. liquor) has a phosphate-combining power equivalent to about 8 g. Ca. It is suggested that the gluconate may be a better form than the acetate in which to administer Al.

Fifteen case reports are given with full pathological, radiological, and biochemical details.—R. ALLCROFT.

I. SILBERBERG, M., & SILBERBERG, Ruth. (1940). **Effects of Ovariectomy and Long Continued Administraton of Anterior Pituitary Extract of Cattle on Skeletal Tissues of Immature Guinea Pigs.**—*Amer. J. Path.* **16.** 491–503. 5 figs., 1 table. [15 refs.]

II. SILBERBERG, M., & SILBERBERG, Ruth. (1940). **The Effect of Thyroidectomy and Administration of Anterior Pituitary Extract of Cattle on the Growth of Cartilage and Bone of Immature Guinea Pigs.**—*Ibid.* 505–524. 4 figs. [Numerous refs.]

I. Of 20 immature female g. pigs subjected to ovariectomy, nine received daily intraperitoneal injections of 1 c.c. of anterior pituitary extract of cattle. At various periods up to four months after ovariectomy the tibiae, femurs, ribs, and vertebrae were removed for microscopic examination. During the first two months after ovariectomy an increased proliferation of the euhyaline cartilage of the epiphyseal disks, and of the covering of the joints and of the ribs took place; calcification and ossification of the cartilage were relatively retarded. At later stages the growth-promoting effect on the cartilage diminished or ceased altogether, while sclerosis of the cartilage was greatly intensified and ossification progressed, although ossification was decreased as compared with normal animals. No evidence of gigantism was observed. In the g. pigs receiving the anterior pituitary extract, the processes of calcification and ossification were intensified as compared with the merely ovariectomized animals. The maturation of the skeletal tissues was therefore accelerated and the effects exerted by ovariectomy were partly counteracted.

II. Thyroidectomy in immature g. pigs was found to cause an accelerated sclerosis of the cartilaginous ground substance and to inhibit the complete differentiation of columnar cartilage cells into hypertrophic cartilage cells. Proliferation of the cartilage cells is maintained and may even be temporarily increased. Endochondral ossification is secondarily affected because of the inadequate supply of mature cartilage cells available for ossification. At later stages the amount of osseous substance in the shaft of the long bones shows little deviation from the normal.

Intraperitoneal injections of anterior pituitary extract into thyroidectomized g. pigs caused increased growth and retrogressive changes in the cartilage, followed by enhanced ossification. Differentiation of the cartilage, however, remained incomplete and normal conditions were not restored even when anterior pituitary hormone was administered. Under these conditions a summation of the effects of thyroidectomy and anterior pituitary hormone occurs.—R. ALLCROFT.

LEDINGHAM, J. C. G. (1940). **Sex Hormones and the Foa-Kurloff Cell.**—*J. Path. Bact.* **50.** 201–219. 10 text-figs., 1 fig. on 1 plate, 2 tables. [Numerous refs.]

Castration reduces these cells to a negligible number in the circulating blood, and the administration of oestrogens, especially oestradiol, can cause these cells to reappear in large numbers in both sexes. Testosterone has a lesser stimulating effect.—J. M. ROBSON.

TECHNIQUE AND APPARATUS

PHILLIPSON, A. T., & INNES, J. R. M. (1939). **Permanent Stomach Fistulae in Ruminants.**—*Quart. J. exp. Physiol.* **29.** 333–341. 9 figs. [12 refs.]

This is a detailed and illustrated description of the technique of preparing rumen and abomasum permanent fistulae in sheep. For the former an equine type tracheotomy tube

was used and for the latter an ebonite cannula with detachable security cuffs.—J. E.

BESTA, B. (1939). L'uso del microscopio a fluorescenza nella ricerca del bacillo di Koch. **[Fluorescent Microscopy in Examination for Tubercle Bacilli].**—*Ann. Inst. Carlo Forlanini.* **3.** 904. [Abst. in *Tubercle, Lond.* **21.** 246, copied *verbatim*].

In examination of 241 specimens for tubercle bacilli Besta found that fluorescent microscopy was a more sensitive method than that of Ziehl-Neelsen, as it yielded positive results in 18·7 per cent as compared with 7·04 per cent with Ziehl-Neelsen.

WETMORE, P. W. (1940). **A Direct Method of Determining the Erythrocyte, Leucocyte and Thrombocyte Count of Fowl Blood.** —*Science.* **92.** 386.

This method is a modification of that of Blair, and consists of staining the blood with aqueous brilliant cresyl blue and pyronin.

The erythrocytes appear as pale oval discs, the thrombocytes vary from pale ovals to faintly coloured lilac bodies. The heterophiles stand out as blue-black bodies, and lymphocytes are faintly pink and round; monocytes are indistinguishable from large lymphocytes. The method gives comparable results when checked against Shaw's method.—A. T. PHILLIPSON.

KOPATSCHEK, F. (1940). Eine formol-volumetrische und eine formol-potentiometrische Methode zur quantitativen Bestimmung des Serumeiweisses. **[A Formol-Volumetric and a Formol-Potentiometric Method for the Quantitative Determination of Serum Protein].** —*Arch. wiss. prakt. Tierheilk.* **75.** 204–211. 3 tables. [4 refs.]

Two methods are given involving the use of neutralized formol for the estimation of serum proteins. The first is a direct application of the ordinary Sorenson titration method. The preparation of colour standards is described to correct for the pigmentation of the serum, and to facilitate accurate colour matching in determining the end point of the titration with 0·1N NaOH using phenolphthalein as an indicator.

The second method depends on the pH change, measured with the quinhydrone electrode, produced when one volume of formol is added to an equal volume of serum.

Both procedures are standardized on the refractometric estimation of serum protein, and empirical factors are given for converting observed titration values and pH changes with horse serum, to protein concentration.

—R. A. KEKWICK.

MISCELLANEOUS

INDIA. (1940). **Sixth Report showing the Progress made in giving Effect to the Recommendations of the Royal Commission on Agriculture in India. Part II. Provincial Government and Administrations [Diseases of Livestock and their Control]. (In the Case of the Provinces of Madras, Bombay, Punjab and Delhi the Progress from 1929 to 1937 had been Reported. In the Case of the other Provinces the Information Relates to the Action taken during the Years 1936 and 1937 only.)** pp. 73–80. Government of India. Department of Education, Health and Lands. [fcp] [Rs. 2-2-0 or 3s. 6d.] [For Part I, see *V. B.* **11.** 137].

The use of the serum simultaneous (serum-virus) method of immunization against RINDERPEST has been superseded by the use of goat virus in Assam, Bengal, Bihar, Bombay, the Central Provinces, Coorg, Delhi, the North West Frontier Province, Orissa, the Punjab, Sind, and the United Provinces. Compulsory inoculation against the disease has not been introduced for control in any province. Details are given of the increase in veterinary hospitals and dispensaries, in several provinces, and of the development of veterinary services and education. Post-graduate courses have been held at the Imperial Institute of Veterinary Research, Mukteswar, for members of provincial veterinary services who are trained for more important posts. Details are given of the research work in progress in the provinces at the veterinary colleges and research centres.

—J. A. GRIFFITHS.

WALKER, U. W. F. (1940). **The Punjab Civil Veterinary Department at Work.**—*Indian Fmg.* **1.** 341–344.

The improvement of cattle breeds in the province occupies a large proportion of the time of the veterinary department, which aims at producing high class pedigree stock and at improving the various indigenous breeds; to

this end the Punjab government maintains the government cattle farm at Hissar with an area of about 40,000 acres of land and about 10,000 head of stock of various species. The department also encourages sheep, goat, donkey, horse, and camel breeding.

Diseases among livestock take a heavy toll every year, but the department is striving to counteract them and has provided a network of 314 permanent veterinary hospitals and dispensaries and 1,229 outlying dispensaries for the treatment of sick animals. With a view to providing qualified veterinarians, the government maintains the Punjab veterinary college at Lahore, and in addition there is a disease investigation officer, provided by the Imperial Council of Agricultural Research, who in collaboration with the Imperial Veterinary Research Institute, Mukteswar, helps to solve the various problems concerning diseases among livestock.

—. (1939). **The Adelaide Institute for Medical and Veterinary Science.**—*Med. J. Aust.* June 17th. pp. 910–912.

The functions of the institute are described—(a) the objects of the institute, (b) a historical note on its origin and general background, (c) notes on administration and organization, and (d) a description of the building, its general design and equipment. While one of the main objects of the institute is to extend facilities already existing in Adelaide for the study of bacteriology, pathology, and biological chemistry, its establishment marks an important advance in Australian research. It is the only institute in the Commonwealth whose work covers both human and veterinary medicine, and it provides services, apart from research, to the Adelaide hospital, county hospitals, private practitioners, Stocks and Brands Department, and teaching facilities for the University medical school and hospital.

—H. B. Carter.

—. (1940). **Manual of the International List of Causes of Death as Adapted for Use in England and Wales, Scotland and Northern Ireland. Based on the Fifth Decennial Revision by the International Commission, Paris, 1938.** pp. lxiii + 166. Numerous tables. London: H.M. Stat. Off. [8vo] [3s. 6d.]

This is a list of the names of conditions responsible for the death of human beings: in other words it is a system of the nomenclature of disease. To veterinary workers this manual is an important source for authoritative nomenclature.

Sergent, Ed., Parrot, L., & Horrenberger, R. (1940). Pour l'unification de la terminologie concernant les " contages, microbes invisibles, virus filtrables, virus, ultravirus, inframicrobes, etc." **[Suggestions for the Unification of the Terminology of Viruses].**—*Bull. Inst. Pasteur.* **38.** 385–395. [1 ref.]

The authors discuss the confusion which exists, especially in the French literature, in the terms used to describe the infective agents commonly called in the English and American literature the " filtrable viruses "; these have been known in French by as many as 18 different names, of which the best known are " *virus filtrable* ", " *virus* ", " *ultravirus* ", " *microbe invisible* ", " *contage* ", and " *inframicrobe* ". The main difficulty arises from the fact that Pasteur first used the term " *virus* " in 1867 to describe any transmissible pathogenic agent, and applied it first to the bacteria which he isolated from fowl cholera, anthrax and swine erysipelas; later, however, he applied it also to the causal agent of rabies, although pointing out that it differed from the former group in that it could not be seen under the microscope and could not be cultivated. In 1878 he adopted the word " *microbe* " suggested by Sédillot to describe any organism which could not be seen without the aid of a microscope, including, of course, the protozoa, the lower fungi, and the bacteria.

In 1899 Beijerinck discovered the cause of tobacco mosaic disease and described it as a " *contagium vivum fluidum* ", at the same time noting that it was sufficiently small to pass through a filter impermeable to the " *microbes* " and that it was invisible under a microscope; from this grew up the term " *contage* " (contagium, in English usage), which the authors suggest be adopted as the name for the filtrable viruses, both on the grounds of priority and clarity. The term " ultravirus " is condemned on the grounds that literally it implies " more than a virus " in the same way that ultra-violet means " beyond the violet " and is not violet at all.

He would thus divide up the aetiologic agents of infectious disease in the following way :– the whole group to be known as " *virus* " in the broad sense used by Pasteur, those visible under the microscope to be known as

"*microbes*", and those invisible to be termed "*contages*".

BRAGA, A. (1939). Sôbre a aferição do imunesôro contra a peste suina. (Contribuição à padronização dos produtos biotérapicos veterinários). II. **[Standardization of Swine Fever Antiserum. II]**.—*Bol. Soc. Brasil. Med. vet.* **9.** No. 2. Reprint pp. 15. 6 tables. [6 refs.] [French summary]. [Part I unobtainable].

B. deals with the standardization of biological products in accordance with new Brazilian legislation.

Discussing the standardization of swine fever antiserum, he describes the methods adopted in several European and American countries. In Brazil eight pigs, weighing from 18–40 kg. and in healthy condition, are divided into two groups. Five animals are given 0·5–1 c.c. of serum per kg. live weight and simultaneously 2 c.c. of the virus preparation. Three pigs receive virus only. The serum is considered satisfactory if all the five animals receiving serum and virus remain healthy, or, at the most, if one animal shows symptoms but recovers spontaneously. The serum is classed as unsatisfactory if three animals show signs of illness within three days of the injections, or if one animal sickens and dies. At least two of the three controls must show typical signs of illness within 4–7 days after receiving the virus.

B. describes the preparation of virus, which must be very virulent if the process of hyper-immunization is to be successful. Immune sera from animals which have been immunized with virus of attenuated virulence are never very satisfactory.—MILLER WATSON.

VISSCHER, M. B. [Edited by]. (1940). **Chemistry and Medicine. Papers Presented at the Fiftieth Anniversary of the Founding of the Medical School of the University of Minnesota.** pp. v+296. Numerous figs., tables. [Numerous refs.] Minneapolis: University of Minnesota Press. [8vo] [28s.]

This volume represents a series of fourteen addresses presented at the 50th anniversary of the founding of the medical school of the University of Minnesota. All of them are masterly in their lucidity and give a bird's-eye view of the subjects indicated by the titles. Most of them are written in such a way as to appeal both to the medical man unspecialized in chemistry and to the biochemist without special medical knowledge. Their veterinary interest, particularly to the laboratory worker and teacher, is as great as their medical interest.

The four dealing with "aspects of immunity and chemotherapy" (asterisked below) have been abstracted at some length [see *V. B.* **11.** 128, 368, 378 and 403], but the full list of titles and distinguished authors may serve to bring the whole volume to the attention of interested readers:– FREUNDLICH, H. Some aspects of the colloid chemistry of membranes; VISSCHER, M. B. The performance of osmotic work in living systems; PETERS, J. P. Some reactions by which solutes may be differentially concentrated by the kidney; SMITH, L. I. Organic chemistry in the pursuit of vitamin research; BURR, G. O. On the necessity of fats in the diet; BEST, C. H. Heparin and thrombosis; *LONG, P. H. The mode of action of sulfanilamide and its derivatives; *GREEN, R. G. The biology of animal viruses; *HEIDELBERGER, M. Recent chemical trends in the study of immunity; *HELMHOLZ, H. F. Chemistry in urinary antisepsis; MCQUARRIE, I. The physico-chemical approach to the mechanisms of convulsive reactivity; GASSER, H. S. Methods of analysis of nervous action; BROUK, D. W. The nervous regulation of visceral processes; CANNON, W. B. The argument for chemical mediation of nerve impulses.

—H. H. GREEN.

LAWRENCE, J. H. (1940). **Some Biological Applications of Neutrons and Artificial Radioactivity.** — *Nature, Lond.* **145.** 125–127. 2 figs.

A description is given of the uses of the cyclotron [see also *V. B.* **9.** 587] and the investigations carried out in the Radiation Laboratory, University of California.

The production of large quantities of radioactive isotopes of various elements, which are chemically similar to their inactive relatives, enables the investigator to study the average exchange and distribution of these "labelled" or "tagged" elements in biological and chemical processes in health and disease [see also *V. B.* **10.** 799].

The effect of neutron rays, produced by the cyclotron, on bacteria, plants, *Drosophila* eggs, animal tumours, and normal mammals is being investigated. As experiments on animals indicate that neutrons are more destructive to neoplastic tissue than to normal tissue, the possibility of their use in cancer therapy is suggested.—R. ALLCROFT.

BRUES, A. M., SUBBAROW, Y., JACKSON, Elizabeth B., & AUB, J. C. (1940). **Growth Inhibition by Substances in Liver.**—*J. exp. Med.* **71.** 423–438. 3 text-figs., 4 figs. on 2 plates, 6 tables. [21 refs.]

Several inhibitors of growth *in vitro* have been described, principally as active fractions obtained from serum or liver, but also as known chemical substances. Certain carcinogenic hydrocarbons inhibit growth *in vivo* and, less actively, *in vitro*, and the authors believe that there is considerable merit in the hypothesis that neoplasia results from a disturbance of equilibrium between inhibitors and accelerators of growth.

The inhibitory effects of different preparations were determined upon hanging drop tissue cultures. Saline and alcoholic extracts of liver were both found to contain inhibitory substances, believed to be essentially the same in both instances, although it appeared that alcoholic extraction freed them from the colloids to which they were bound in the native state. Ethylamine was isolated from an alcoholic filtrate of a purified liver fraction, and was found to be inhibitory to growth in a concentration of 0·5 mg. per c.c. This substance was responsible for a small portion only of the total inhibitory material present in liver, and the steps taken towards the eventual isolation of the remaining factors are described.

—ALASTAIR N. WORDEN.

BRAESTRUP, F. W. (1940). **The Periodic Die-Off in Certain Herbivorous Mammals and Birds.**—*Science.* **92.** 354–355. [17 refs.]

The cyclic fluctuations in the numbers of certain higher animals are known to coincide with meteorological cycles, but B. states that it is generally agreed to-day that the phenomena cannot be explained by direct climatic influence. During their periods of maximum abundance, the snow-shoe hares, *Lepus americanus* [see *V. B.* **9.** 571.] are said to exhibit a sort of pica, in which they are eager to gnaw or lick anything touched by sweaty hands. These and other observations suggest, according to B., that a mineral deficiency may be present. Although plants containing essential mineral elements may become scarce owing to ingestion by an overstocked animal population, B. suggests that there may be a climatic interference at certain times with the soil bacterial processes upon which the mineral contents of the plant depend.

—ALASTAIR N. WORDEN.

OFFICIAL AND OTHER REPORTS

GREAT BRITAIN. (1940). **Annual Report of the National Institute for Research in Dairying, University of Reading, for the Year ending 30th September, 1939.** [KAY, H. D.] pp. 87. 4 tables, 1 graph. Shinfield, Reading: National Institute for Research in Dairying. [4to].

The report consists of two sections. The first deals with changes in staff, appointments, the effect of the war on the institute work and finance, and the second gives the reports of the various departments.

The institute herd, which is attested, was subjected to the tuberculin test in May 1939: there were no reactors. CONTAGIOUS ABORTION is being eradicated by means of the agglutination test and segregation of reactors. No animals have become positive to the test since 1937: at present the herd consists of 123 negative and one positive animal, assuming the untested calves to be negative.

Experimental work by the Dairy Husbandry Department included such subjects as KETOSIS in cows, NUTRITIONAL ANAEMIA in unweaned pigs and diet for pigs.

The Bacteriological Department continued work on MASTITIS, and confirmed the findings reported in the previous report [*V. B.* **10.** 398]. The method of testing for mastitis and simple confirmatory methods are described. Under other investigations it is stated that bovine tubercle bacilli in butter (salted or unsalted) kept at ordinary room temperature in summer could not be recovered after 14–21 days. The Dairy Bacteriology Advisory Department examined 1,790 milk samples for the presence of *Mycobacterium tuberculosis* and found 102 to be positive.

The Physiology and Biochemistry Department continued nutritional studies, *e.g.* on best treatment of milk, the growth promoting properties of summer and winter milk, the effect of pasteurization and sterilization on the vitamin content of milk, vitamin A studies with pigs, etc.—J. C. WALLACE.

GREAT BRITAIN. (1940). **Work of Animal**

Diseases Research Association, Moredun Institute, Gilmerton, Mid-Lothian, 1939. —*Trans. Highl. agric. Soc. Scot.* **52.** 118–120.

LOUPING-ILL.—During the past year there was carried out a large-scale field experiment for the purpose of testing the comparative efficiency of vaccine prepared from virus obtained by artificial culture in the laboratory and of that derived from sheep affected with the disease. It was found that the "new type" vaccine is capable of affording a degree of protection equal to that of the "old type".

For the purpose of assessing the value of hyperimmune serum in the prevention of louping-ill in lambs, an extensive controlled experiment was also carried out in the field. It was shown that by the use of hyperimmune serum the mortality in young lambs could be markedly reduced. The serum is, however, expensive and difficult to produce on a large scale; further experiments, therefore, are now in progress for the purpose of evolving a vaccine which will be at once safe and effective for use on young lambs.

BRAXY.—Braxy vaccine has been issued for several years as a "single dose vaccine" with good results. On farms where braxy is particularly virulent two doses should be given.

WHITE SCOUR IN CALVES.—Investigations carried out during the previous three years had afforded evidence that calves born from cows whose colostrum is deficient in vitamin A are predisposed to white scour, whereas calves receiving colostrum rich in vitamin A are rarely affected.

SCRAPIE.—Since evidence has been obtained that scrapie is due to an infective agent, an experimental sheep run has been bought and is being maintained for the purpose of studying the cause and nature of the disease. Because of the prolonged incubation period of scrapie the investigation will be a lengthy one.

PINE.—It has now been definitely established that in certain districts pine can be both prevented and cured by the administration of cobalt. Further experiments are now in progress designed to determine whether the application to pasture of cobalt-rich manures will raise the cobalt content of the herbage and so prevent the disease.

GRASS SICKNESS IN HORSES.—During 1939 the pasture from thirty "affected" fields was the subject of systematic biochemical study, and further investigation of the development of the disease in its early phases has been carried out.

BOVINE CONTAGIOUS ABORTION.—Fundamental studies on *Brucella abortus* as it affects laboratory animals are being continued.

GREAT BRITAIN. (1940). **Work of the Rowett Research Institute, Bucksburn, Aberdeen, 1939.**—*Trans. Highl. agric. Soc. Scot.* **52.** 120–121.

The following is of veterinary interest:– "FOWL PARALYSIS.—Results of experiments extending over several years are as follows:– The disease is of an infectious nature and the agent responsible is transmitted *via* the egg. Effective control in several outbreaks can be obtained (a) by removing the chicks at day-old to clean pasture and premises well away from the affected area, or (b) by confining the whole stock indoors for at least one generation and replacing the floor litter at weekly intervals."

I. EIRE. (1940). **Report of Veterinary College of Ireland, 1939-40.**—*Rep. Minist. Agric. Eire, 1939–40.* pp. 38–43 and pp. [31]–[32]. 2 tables.

II. EIRE. (1940). **Report of Veterinary Research Laboratory, 1939-40.**—*Ibid.* pp. 71–72.

I. The number of students at the college during the year was 238, including 53 new entrants.

The number of animals treated at the college clinic was 9,874, including 1,548 horses. In the Anatomy Department investigations were conducted on such subjects as the methods of preserving anatomical specimens and the anatomical variations in the genital organs of animals. In the Physiology and Biochemistry Department, pregnancy tests were carried out and the oestrous cycle in cows was studied with a view to determining the value of hormone preparations in the treatment of sterility. The work of the Pathology Department is divided into three sections, *viz*, general pathology and bacteriology, parasitology, and poultry pathology, and it includes teaching, examining and reporting on specimens, advising veterinary surgeons, poultry instructors and farmers and preparation of vaccines.

Details are given of the results of the examination of the 110,281 specimens (including 105,471 for the BACILLARY WHITE DIARRHOEA test) dealt with during the year. There has been a reduction in the number of outbreaks of infectious disease in poultry except NEURO-LYMPHOMATOSIS, there being 99 outbreaks of

this condition as compared with 87 in the previous year.

II. The work of the laboratory is divided into three sections, *viz*, diagnosis and advisory work, preparation and issue of vaccines, and research work. The following numbers of specimens were received for examination :– tuberculosis 3,029 ; anthrax 12 ; contagious bovine abortion 649 ; parasitic mange 3 ; sheep scab 93 ; swine fever 110, and miscellaneous 315. The anthrax, parasitic mange, and swine fever material was negative ; 77 scrapings from sheep contained sheep scab acari.

The following vaccines were issued :– 26,365 doses of blackleg vaccine ; 23,343 doses of braxy vaccine, and 4,051 doses of anti-abortion vaccine.—J. C. WALLACE.

INDIA. (1938). **Annual Report of the Imperial Veterinary Research Institute, Muktesar, for the year ending 31st March 1937.** [WARE, F.] pp. 67. 2 tables, 6 appendixes. Delhi : Manager of Publications. [8vo] [Re. 1-2 or 2s.]

The report of the Officiating Director (W. TAYLOR) deals with staff, supplies, and services, and general details regarding production of sera, instructional courses, research, finance, etc.

REPORT OF THE SEROLOGY SECTION [SHIRLAW, J. F.]—Observations on BLACKLEG and ANTHRAX vaccines were made, and work on BOVINE and EQUINE CONTAGIOUS ABORTION was continued. Strains of *Streptococcus equi* have been graded for virulence in rabbits, and strains of intermediate virulence are on trial for intranasal inoculation of young horses for the control of STRANGLES. Strains of low virulence have been selected for use subcutaneously as a vaccine. Chemotherapeutic methods were also under trial. Observations on the blood phosphorus and calcium in hill bulls affected with RINDERPEST showed that the reaction to infection is accompanied by a fall in blood phosphorus and a subsequent rise on subsidence of the febrile reaction. In fatal cases there is often a sharp rise in blood phosphorus just before death. The calcium level is not appreciably altered. Estimations of variations in serum protein fractions in buffaloes undergoing immunization have been made, and it is hoped that a method of estimation of serum potencies in terms of variation of protein fractions will be evolved. Observations on the precipitation of active principles of anti-rinderpest serum and on viability of virus have also been made. Research on NEWCASTLE (RANIKHET) DISEASE of fowls has failed to demonstrate any effective means of control ; the disease shows no signs of abating in severity or incidence. Observations on CAPRINE CONTAGIOUS PLEURO-PNEUMONIA suggested that this disease is primarily a parasitic bronchopneumonia. Research on EQUINE ENCEPHALOMYELITIS suggested that this disease as it occurs in India is infectious. A virus was isolated and passaged 14 times through mice, in which it produced lesions similar to those of the natural disease in horses, but attempts to transmit the virus to horses were not successful. Deficiency diet experiments, observations of nutrition in relation to abortion, and a large number of routine examinations were also made.

REPORT OF THE PATHOLOGY SECTION [DATTA, S. C. A.]—Further investigations failed to yield evidence that JOHNE'S DISEASE is transmissible *in utero*, that it can assume a bacteraemic form, or that the bacilli can be excreted in the milk. An outbreak of the disease in Indian goats was studied. Lesions of TUBERCULOSIS were observed in the larynx and epiglottis of horses which had shown symptoms of roaring during life. *Clostridium welchii* was isolated from the heart blood of two cases of rapid death in hill bulls after a brief illness associated with gastric OEDEMA and GASTRO-ENTERITIS. An outbreak of a highly virulent and rapidly fatal disease of goats was intensively studied, but the aetiology remained obscure.

Other conditions studied were MASTITIS in milch cows and buffaloes, LYMPHANGITIS in horses, SWINE PLAGUE, FOWL SPIROCHAETOSIS, HORN CANCER in cattle and ENZOOTIC BOVINE HAEMATURIA.

REPORT OF THE PROTOZOOLOGY SECTION [WARE, F.]—Anti-THEILERIASIS serum made at the stage of complete or nearly complete disappearance of the parasites from the peripheral circulation was found to be the most potent. Satisfactory results have been obtained with this serum in the cure of natural cases of acute THEILERIASIS in imported bulls.

Observations were also made on COCCIDIOSIS, CANINE PIROPLASMOSIS, and BARTONELLA INFECTION in dogs. A case of REDWATER in a buffalo which did not respond to trypanblue treatment appeared to be caused by *Babesia bovis* (not previously recorded in India), though this could only be judged on morphological grounds.

ENTOMOLOGY.—The spinose ear-tick (*Ornithodoros megnini*) reported in India for the first time in last year's report was found to be far more widespread than was at first thought, *e.g.* at Saugor 13% of 528 horses were found to be infested with these ticks. The incubation period of the eggs was found to be 53 days, and larvae introduced into the ear of a horse developed into fully engorged nymphs after 35 days. An investigation into the warble-fly pest has been initiated.

REPORT OF THE ANIMAL NUTRITION SECTION, IZATNAGAR [SEN, K. C.]—This is the first report of this newly established branch and deals mainly with a definition of the functions and duties of the section.—H. E. HARBOUR.

HONG KONG. (1940). **Annual Report of the Colonial Veterinary Surgeon for the Year 1939.** [MACKENZIE, W. J. E.] pp. 3. Stanley: Hong Kong Prison. [fcp] [30 cents].

Livestock has increased in numbers for supply purposes owing to Japanese military activity in neighbouring Chinese territory. Animal health has been good during the year. BOVINE CONTAGIOUS ABORTION is well under control. Segregation of all infected animals and the rearing of all the calves on milk from healthy cows is practised. The only five deaths from ANTHRAX were in two ponies and three cattle. Tuberculin testing is carried out by the majority of cattle owners. Poor milkers among the reactors as well as those infected with *Brucella abortus* or any abnormality of the udder are slaughtered. All milk in the colony is pasteurized. A few cases of TUBERCULOSIS of the neck glands in swine were found. There were 99 cases of SWINE ERYSIPELAS, one of CASEOUS LYMPHADENITIS in a sheep, and 21 of bovine ANAPLASMOSIS. There was no outbreak of RABIES. One outbreak of RINDERPEST occurred in 50 animals, the mortality being 44%.

The veterinary service is not autonomous in Hong Kong, being a part of the Sanitary Department. Livestock imported for slaughter were:- 101,518 cattle, 535,236 swine and 21,129 sheep and goats. This is a considerable increase.—J. A. GRIFFITHS.

ALGERIA. (1939). Fonctionnement de l'Institut Pasteur d'Algérie en 1938. **[Report of the Pasteur Institute of Algeria for 1938].** [SERGENT, Ed.]—*Arch. Inst. Pasteur Algér.* **17.** 351–394. 2 tables. [Numerous refs.]

Notes are given on the transmission of canine leishmaniasis. With reference to animal diseases caused by rickettsiae, it is claimed that *Rickettsia* should be considered as a genus. Preventive vaccination against bovine PIROPLASMOSIS as practised for the last 15 years in Algeria has proved very satisfactory. For all North Africa the losses resulting from vaccination, including natural death in vaccinated animals, fluctuated between 0·1–1·2%, whilst the mortality in herds of European pure-bred unvaccinated cattle was nearly 100%. Diagnosis of SWINE FEVER by the intradermal reaction was found to be useful in the prophylaxis of the disease.

The usual statistics of diagnostic work on animal diseases are given in a table.

Information is given on Pasteurian treatment of persons for RABIES, with data on the animals involved as transmitters.

During the year the institute supplied large quantities of sera and vaccines for veterinary purposes.—L. TOBBACK.

BELGIAN CONGO. (1940). Congo Belge: Gouvernement general. Zootechnie et Epizooties. Rapport vétérinaire 1939. **[Veterinary Report for 1939].** [COLBACK, H. R. F.] pp. 50. 2 tables, 6 appendixes. [fcp] [Mimeographed].

STAFF.—There were 16 European veterinary surgeons, 12 European "auxiliaries" and about 100 native assistants employed in the service, and it is also stated that 11 European veterinary surgeons were employed by livestock breeding societies.

A veterinary laboratory at Gabu-Nioka worked on TRYPANOSOMIASIS, EAST COAST FEVER, and HELMINTHIASIS.

ANIMAL DISEASES.—These are reported upon along with the state of animal husbandry relative to (1) European and (2) indigenous farmers in the six provinces of Leopoldville, Coquilhatville, Stanleyville, Costermansville, Lusambo, and Elizabethville. The prevailing diseases are the same as those of adjacent Central African territories, but there was freedom from BOVINE CONTAGIOUS PLEURO-PNEUMONIA and RINDERPEST in all parts. ANTHRAX was observed in three provinces, TUBERCULOSIS in Elizabethville, TRYPANOSOMIASIS in all parts, EAST COAST FEVER in three provinces, FOOT AND MOUTH DISEASE in two, SWINE FEVER in one (bad outbreak in Leopoldville) and RABIES in two. The common PARASITIC DISEASES were prevalent. The numbers of outbreaks and cases

are summarized in a table and a list of worms of equines, cattle, sheep, goats, and swine in Stanleyville is given.

TUBERCULOSIS has been troublesome in Elizabethville where 805 bovine cases were detected at meat inspection. Tuberculin tests showed a 17% infection rate among 8,400 cattle tested. The disease is very rare in the other provinces.

Vaccination against ANTHRAX was carried out in Stanleyville, where 87,400 cattle were immunized and in Costermansville where 1,550 vaccinations were carried out. In Leopoldville bovine TRYPANOSOMIASIS was due in order of frequency to *T. vivax*, *T. congolense*, *T. brucei* and *T. theileri*. Tartar emetic and orpiment were used therapeutically. In Stanleyville *T. vivax* predominated, whilst *T. simiae* occurred in pigs. Affected cattle are sought out and treated with tartar emetic. In Elizabethville *T. dimorphon* and *T. congolense* occurred frequently; an attempt to control the disease by eradicating tsetse flies is to be undertaken.

EAST COAST FEVER was prevalent only in the Kivu district of Costermansville where it killed off almost 85% of the calves. Acaprin and gonacrine proved valueless against it, but injections of calcium chloride were very efficacious.

ANIMAL HUSBANDRY.—A table gives a census of European- and native-owned animals. The totals of both categories were :– 1,280 equines, 400,000 cattle, 154,000 swine, and 10,000 European-owned sheep: native-owned sheep and goats were not fully enumerated but exceeded half a million.—J. E.

Extracts from Annual Reports of Agricultural Experiment Stations, U.S.A. and Dependencies. [The matter given here is a bare outline of the work done. When papers by the staffs of these stations are published abstracts are prepared from them and included in the *Veterinary Bulletin* as a matter of routine. Details of the titles of these reports will be found in *Index Veterinarius*].

ARKANSAS, 1937–38.—A deficiency of vitamin B_6 associated with DERMATITIS had no effect on the trypsin or amylase concentrations of body tissues, but there was marked reduction in the lipase concentration; vitamin B_1 deficiency produced a moribund state with paralysis and convulsions, and the experimental animals [species not stated] showed a significant reduction in concentration of pepsin. Results of analyses of bovine mammary gland tissue showed that comparatively large amounts of free fatty acid are present in actively secreting glands, and evidence indicates that this is due to the presence of lipolytic enzymes. Relation of dietary silicon to silicon content of the wool of sheep was studied, but no connexion could be proved. Glycine was found to be toxic to hens when fed at the rate of 4 g. per day; *dl*-alanine was also toxic. Manganese metabolism of the laying hen and the chick embryo was studied.

HAWAII, 1939.—Experiments on the dosage and period of administration in the treatment of LIVER FLUKE in cattle with "distol" and kamala gave satisfactory results; preliminary studies were made with hexachloroethane, but results do not justify conclusions being drawn as to its safety and efficacy. The relation of nutrition to TAPEWORM INFESTATION of poultry was also investigated; the intermediate host of the caecal fluke (*Postharmostomum gallinum*) was found to be the land snail, *Eulota similaris*; intermediate hosts of the pinworm (*Subulura brumpti*) were found to be earwigs, beetles, and possibly grasshoppers. A list of 28 different parasites from horses raised and killed in Hawaii is given. Results of work on the vaccination of day-old chicks against FOWL POX were not altogether satisfactory. Wire-floored batteries and houses were found to be very efficient in the control of avian COCCIDIOSIS.

MINNESOTA, 1938–39.—Research projects on BRUCELLOSIS, LYMPHADENOMA of fowls, SWINE FEVER, and calcium and phosphorus requirements of cattle are listed.

MISSOURI, 1936–37.—The reproductive physiology of swine, horses, and sheep was investigated in detail, as was the physiology of lactation in relation to nutrition, endocrine influences, and disease. Work was also carried out on FOWL PARALYSIS, AVIAN LEUCOCIS, BLACKHEAD in turkeys, TOXAEMIA in sheep, PARASITES of sheep, the agglutination test for BRUCELLOSIS and transmission of the infection from swine to cattle, and the agglutination test for PULLORUM DISEASE. All the subjects are discussed in some detail.

MONTANA, 1937–38.—Investigations are in progress on COCCIDIOSIS in cattle, PNEUMONIA ("LUNGER DISEASE") of sheep, INTESTINAL PARASITES of sheep, NECROBACILLOSIS in sheep and cattle, methods for control of BRUCELLOSIS in range cattle and of mastitis in sheep, and on EQUINE INFECTIOUS ANAEMIA with particular reference to differential diagnosis. No details of work are given.

NEVADA, 1938–39.—Studies were made of two poisonous range plants, *Astragalus speirocarpus* (one of the loco weeds) and *Corydalis caseana*; seven alkaloids were isolated from the latter. New methods were developed for cultivating *Clostridium hemolyticum* the causal organism of HAEMORRHAGIC DISEASE in cattle; LYMPHANGITIS in cattle was successfully transmitted to laboratory animals; iodine and phosphorus deficiencies were found in cattle; large-scale tests were carried out on immunization against EQUINE ENCEPHALOMYELITIS.

NEW MEXICO, 1937–38.—The calcium and phosphorus metabolism of range cattle was studied and also the relationship between vitamin A and BLINDNESS and OEDEMA in dairy cattle.

NEW MEXICO, 1938–39.—The BLINDNESS and OEDEMA investigations were continued.

CORNELL UNIVERSITY, N.Y., 1938.—The problem of the specific cause of MUSCULAR DYSTROPHY in certain herbivora produced by rations containing cod liver oil was studied, and also the vitamin B complex requirements of sheep. Birth mortality of piglets was prevented by subcutaneous injection of pituitrin after the birth of the first pig in the litter. STERILITY in cows was treated with massive doses of progynon B. The effect on STIFF-LAMB DISEASE of feeding daily doses of cod liver oil to the lactating ewes was studied. A comprehensive study was made of the haemolytic streptococci which are ordinarily found in milk, and a number of useful methods have been developed for the differentiation and identification of a number of the non-pathogenic types. Successful attempts were made to breed disease-resistant White Leghorns; the reproductive physiology of fowls, and the role of manganese in their nutrition were studied. Genetic investigations were made into "CURLED TOE", CONGENITAL BLINDNESS and the "naked" mutation in fowls.

CORNELL UNIVERSITY, N.Y., 1939.—Work on the use of hormones in combating STERILITY in cattle and investigations into the causes and prevention of birth mortality in piglets were continued. Artificial insemination methods were developed. The control of horse STRONGYLES by the rotational grazing of pasture plots, coupled with chain-harrowing to spread the manure when the animals leave each plot, was planned. Work on the relation of feeding and management to the cause of STIFF-LAMB DISEASE was continued, phosphorus supplements being fed to the ewes. The requirements of poultry for proteins, manganese, charcoal, and the vitamin B complex were investigated; the breeding of disease-resistant fowls was continued; infertility in fowls was studied.

SOUTH CAROLINA, 1938–39.—An outbreak of TRICHOMONAS ABORTION in the station herd was controlled successfully with the aid of artificial insemination; the technique of artificial insemination was developed. The control of FOWL PARALYSIS with wheat germ oil was investigated.

TENNESSEE, 1938.—The work of controlling BRUCELLOSIS in the station's breeding herds was continued.

WASHINGTON, 1938–39.—The connexion between SWINE ERYSIPELAS and ARTHRITIS in swine was demonstrated. The development and spread of bovine MASTITIS was studied, and mastitis streptococci were found to be readily destroyed by soaps. *Amsinckia intermedia* (yellow burweed or tarweed) produced LIVER CIRRHOSIS in swine, cattle, and horses. *Salmonella pullorum* inoculated into sterilized soil which was not otherwise contaminated remained viable for at least six months. Studies on FOWL LEUCOSIS were commenced. A Gram-positive coccus was isolated from birds giving doubtful reactions to serological tests for poultry diseases, and was studied in this connexion.

WESTERN WASHINGTON, 1938–39.—Experiments were conducted to find whether alfalfa stem meal, spruce wood flour, and charcoal would prevent CANNIBALISM in chickens. Promising results were obtained in breeding disease-resistant poultry. It was found that PULLORUM DISEASE was not transmitted to hens mated with naturally infected males. The relationship of eye lesions to other lesions in FOWL LEUCOSIS was studied. An experiment is in progress to study the effects of changing straw litter in the laying house upon the spread of COCCIDIOSIS and other diseases. An acute outbreak of *Erysipelothrix rhusiopathiae* infection in turkeys was diagnosed.

WISCONSIN, 1938–39.—Sulphur feeding to prevent COCCIDIOSIS was proved to be unsafe during the winter as it promotes vitamin D deficiency in birds kept out of direct sunlight, even if cod liver oil is fed. The value of irradiated yeast in poultry nutrition, and the effect of manganese supplements on hatchability were studied. Rations containing as little as 0·5% boric acid, or less than 0·1% boron, had very unfavourable effects on chickens.

BOOK REVIEWS

HALNAN, E. T. [M.A., Animal Nutrition Research Institute, School of Agriculture, Cambridge], & GARNER, F. H. [M.A., Cambridge University Lecturer in Agriculture (Animal Husbandry)]. (1940). **The Principles and Practice of Feeding Farm Animals.** pp. x+359. 8 figs., 41 tables, 23 photographs, 1 appendix. London, New York & Toronto: Longmans, Green & Co. [8vo] [15s.]

The names of the authors of this compact book and the school from which it comes, are sufficient guarantee of its soundness. It only remains to indicate its scope.

The scientific principles of nutrition and their application to the feeding of farm livestock are explained in simple terms, and the data required for practical use are clearly set out. While primarily intended for students taking a degree or diploma in agriculture, the inclusion of a variety of well-proved rations and the clear exposition of the principles of good husbandry should also appeal to the practical farmer and widen the purchasing public. The facts and figures incorporated in the text and in the appendixes also render it useful for ready reference in many directions.

The first section of 84 pages deals with theoretical considerations and covers chemical composition of feeding stuffs and animals, the fate of food in the animal, the qualitative or biological values of feeding stuffs, and feeding standards. The second section deals with practical considerations and covers, in succession, the common feeding stuffs of the British Isles, the uses of grassland and its products for livestock, the preparation of feeding stuffs, the general principles underlying the feeding of farm animals, the feeding of rearing cattle, of dairy cows, of fattening cattle, of sheep, of pigs, of horses, and of poultry. There is a final chapter on feeding in war time. The eight appendix tables include composition and nutritive value of the common feeding stuffs, ready reckoners for compounding rations and simplifying price calculations, and data on weight of foods by measure.—H. H. GREEN.

CLARKE, M. H. [M.R.C.V.S.]. (1941). **First Aid to Dogs and Cats. A Handbook for the Technical Personnel of the National A.R.P. for Animals Committee; a Guide to All Students of First Aid and a Ready Book of Reference to Small Animal Owners.** pp. ix+145. 51 figs. London: Baillière, Tindall & Cox. [8vo] [3s. 6d.]

This small book is the first of its kind to be published and should find a ready sale amongst small animal owners, who have long expressed a wish for such a work. The rigid ethical code of the body governing the veterinary profession in this country has undoubtedly acted previously as a deterrent to possible authors.

The author is to be congratulated for having written such an acceptable and topical booklet but, as is almost inseparable from a first edition, some errors and omissions are to be expected. It is confidently hoped that an endeavour will be made to make future editions comparable to similar works in the field of human first aid treatment.

No acknowledgements have been made to "Air Raid Precautions for Animals" published by the Home Office and to the publications of the National A.R.P. for Animals Committee (N.A.R.P.A.C.). [See *V. B.* **10.** 634, and **11.** 68.]. If these were not consulted a grave omission has been made, whilst if they were consulted fuller use might have been made of them with advantage.—H. E. BYWATER.

PARKER, T. J. [D.Sc., F.R.S., Professor of Biology in the University of Otago, Dunedin, N.Z.], HASWELL, W. A. [D.Sc., F.R.S., Emeritus Professor of Biology in the University of Sydney, N.S.W.]. (1940). **A Text Book of Zoology. Volume I.** Revised by LOWENSTEIN, O. [Dr. phil., Ph.D., Lecturer in the University of Glasgow]. pp. xxxii+770. 733 figs. **Volume II.** Revised by FORSTER-COOPER, C. [M.A., Sc.D., F.R.S., Late Director of the University Museum of Zoology, sometime Fellow of Trinity Hall, Cambridge, Director of the British Museum (Natural History)]. pp. xxiii + 758. 656 figs. [Numerous refs.] London: Macmillan & Co. Ltd. [6th Edit.] [8vo] [36s. each].

There is wide agreement among teaching zoologists that there is room for improvement in the lay-out of the formal zoology courses in the Universities. Some feel that more attention should be devoted to experiment, others that ecology or a scientific natural history should occupy a more prominent place in what is

essentially a living study. However much one agrees with these revisions, it must be admitted that the philosophy of zoology is to be found in the evolutionary background provided by the animal types studied, which can only be sought and discovered in comparative anatomy, as long as the study is truly comparative and not the restricted study of isolated forms. In this lies the great merit of this book, but it is not a text-book for the elementary student. A superficial canter into zoology, provided by the early professional and intermediate examination courses does little to indicate a process of organic evolution as it ignores some of the most significant groups like the Onychophora, Urochorda and Hemichorda, besides numerous fossil forms, of which the elementary student is required to know little or nothing. Comparative anatomy and palaeontology are necessary tools in the zoologist's trade and, however much one may deplore the paucity of ecological and experimental studies in the training of a zoologist, he must be equipped with the capacity to compare evolutionary lines in organic systems.

For those who graduate into advanced zoology, or who require a reliable work of reference, this text-book has always had much to recommend it in its inductive approach to the science. The revisers have skilfully preserved this approach. LOWENSTEIN has rewritten some of the first volume, has eliminated old hypothetical phyla, and has improved the illustrations.

It might well be said that the second volume of the old edition had become more dated than the first. Our knowledge of the fishes, amphibia, and reptiles, in particular, has been much enlarged, especially in its palaeontological aspects, by the work of contemporary zoologists like DE BEER, GOODRICH, MOY-THOMAS, and WATSON, to name but a few. The student has little time for comprehensive reading along special lines, and yet it is essential that he should be familiar with certain of the broader modern aspects of his subject. Apart from his lecture notes, which, if the lecturer is worth his salt, should certainly take account of the more important advances in knowledge, the student is largely dependent on his general text-book. FORSTER-COOPER has obviously made a wide search of the literature and has incorporated much of the latest information in his revision of the second volume.

The additional text-figures are welcome, and figure 339, which illustrates the architecture of the types of reptiles' skulls, serves as an example of the real value of diagram over portrait. The use of diagrams, free from shading, would have been helpful in illustrating the structures of the bird palates. FORSTER-COOPER wisely makes use of footnote references giving fuller details where a subject is of importance and where lack of space forbids more than brief mention in the text. His list of references to both general and special books and papers is most valuable.

The general impression conveyed by the reading of these revised volumes is wholly satisfactory; labour has been well expended on a notable work which will once more take its place among our best up-to-date zoological text-books. One wonders whether the publishers have ever considered the production of a supplementary volume devoted to the general issues raised by the other two. Perhaps the sections which are now withdrawn on geographical distribution, the philosophy of zoology and the history of zoology, could be reinstated in modern dress. The reviewer believes that the sales of the supplementary volume would rival those of the main work itself.—C. H. S.

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The publication of *Index Veterinarius* commenced with the indexing of the literature of 1933. It is a complete index of current publications relating to veterinary research, public health, administration, education and other aspects of veterinary science.

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